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DOCUMENTS

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ASSEMBLY

STATE OF NEW-YORK

SIXTY-SECOND SESSION

1889



ALBANY:
PUBLISHED BY THE STATE

DOCUMENTS
OF THE
ASSEMBLY
OF THE
STATE OF NEW-YORK,
SIXTY-SECOND SESSION,
1839.

VOLUME V.
FROM No. 266 TO No. 325 INCLUSIVE.



ALBANY:
PRINTED BY E. CROSWELL, PRINTER TO THE STATE.
.....
1839.

DOCUMENTS

OF THE

ASSEMBLY

OF THE

STATE OF NEW-YORK.

SIXTY-SECOND SESSION.

1880.

VOLUME 7.
NEW YORK: J. B. LIPPINCOTT & CO., 15 N. 2ND ST. 1880.



ALBANY

PRINTED BY J. B. LIPPINCOTT & CO., 15 N. 2ND ST.

1880

828,747
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1839 ✓
No. 266.

IN ASSEMBLY,

February 28, 1839.

REPORT

Of the committee on banks and insurance companies, on the petition of the President, Directors, and Company of the North River Bank.

Mr. Kellogg, from the committee on the incorporation and alteration of the charters of banking and insurance companies, to which was referred the petition of the president, directors and company of the North River bank of the city of New-York, and one hundred and seventeen dealers with said bank, praying for an increase of its capital and an extension of its charter,

REPORTS:

That the North River bank was incorporated in 1821, to continue until 1st July, 1842, with a capital of \$500,000. The petition sets forth that its charter was obtained with a view, "more especially to advance the interests of the northern and western parts of the city;" that it "was accordingly located and has since continued its operation on the west side of the town;" that in its management, "especial reference has been had to the accommodation of the inhabitants of that part of the city;" that "it has been of great service in facilitating the business and advancing the interests" of the same; and that "it has at all times preserved its character for integrity and fairness in its transactions, and for a strict observance of its charter obligations." The petition further represents that "the general increase of business of the city," as well "as the peculiar business character, which that portion of the town is rapidly assuming," is rendering the institution "daily of more and more importance." These representations stand unquestioned before your committee, and from the character of your petitioners, as well as the

common fame of the institution, they conceive are entitled to their confidence.

Your petitioners say, "they are convinced they could with great advantage increase their capital," to double its present amount, and after arguing that the extension of "old and well established banks," is not at variance "with the system now being tried under the general bank law;" that that law has removed from them the character of *monopoly*; that the continuance of such chartered banks, "will operate to prevent a too sudden and injudicious increase of institutions under the new system;" and that the adoption of this system, suggests the only plausible argument against re-charters, they pray, "that the charter may be extended thirty years, and that they may be privileged to increase their capital to ONE MILLION OF DOLLARS."

That the character of monopoly is essentially removed from the chartered banks, by the unlimited competition created by the general bank law, is a view of the subject to which your committee entirely assent, but it does not change the character of their Legislative privilege, though it may modify its value. That privilege has heretofore excited public jealousy, and been one of the chief grounds of complaint against the system.

Should experience prove that capital invested in associations formed, and to be formed under the new system, does not realize as good returns as that employed under the old,—a supposition your committee apprehend will, under the present provisions of the law, prove true,—then the possession of that character may not yet be without danger. Unequal advantages will be liable to excite mutual jealousy. Interest and cupidity on one hand, and the claim of equal privileges on the other may produce unhappy conflicts in public sentiment, and tend seriously to disturb the currency. Uniformity of benefits to the public and to the capitalist, under both systems, seems to your committee should be a prominent object of legislation on this subject. The fear that the extension of the old system might not contribute to this end, they believe is a strong argument against it.

Besides, if your committee are correct in their estimate of the importance of ultimate unity in the whole system, as their former reports have expressed, then they submit whether that object should not be paramount, and kept steadily in view. They have discovered no probable mode of attaining it, but to confine the old system to its present limits, subject to the gradual decline which the expiration of charters, through

a long series of years will produce, and to make it the business of present and future legislation to improve and perfect the new, as experience may instruct, so that capital, as it becomes disengaged from the one, may slide harmoniously into the other, or seek different employment as the demands of business may prompt, without public inconvenience or private loss.

Under our republican institutions, where the will of the people is the supreme law, all just legislation must accord with public sentiment. On the subject under consideration, your committee have on former occasions, expressed their belief that the general bank law was the result of public sentiment, expressed with unusual unanimity, and their entire conviction that that sentiment is quite as unanimous in demanding a full and fair trial of it.

Your petitioners express their belief that "the people at large have confidence" in the chartered banks of the State, and "that the continued existence of the old and well tried institutions, as modified by experience," will have a salutary influence in restraining an injudicious increase of banking associations. They also remind us "that the old system with all its imperfections has made our great State what it is, and that before we discard it, sound wisdom would dictate much caution." In all these views your committee cordially concur, and in obedience to their counsels, would recommend no sudden or unadvised innovations upon the present boundaries of that system.

Your petitioners think the two systems "do not necessarily interfere with each other," and that "their co-existence for some length of time will be of mutual benefit," as well as "a source of safety to the community, at any rate" until "their relative merits can be practically tested." In the judgment of your committee the true way to ensure a continuance of their harmony, is to secure to each equal benefits, as has already been suggested, and to give to the public policy a steady and firm direction towards an ultimate union upon the system, which public opinion has chosen. With an established policy, sustained by the public will, capital seeking investment in banking would acquiesce in what was settled, and no collision would be apt to arise as to the form of its employment. Existing charters, which no rational mind proposes to invade, seem to give all the time that ought to be requisite to test and perfect the new system.

As yet the system is untried, the field is unexplored, and the law is very possibly imperfect. Were the charter of your petitioners about to

expire, during the present or the next year, your committee would consider it due to the public interest, to recommend a short extension of time, that a reasonable opportunity might be afforded to test and improve the general banking law, before compelling the perpetuation of the institution under its provisions, or hazarding the dispersion of its capital to other objects. But before the expiration of this charter, experience and improvement may have so far perfected the law, and commended it to the favor of capitalist, and the confidence of the public, as to furnish a mode of perpetuating the institution and enlarging its capital, without the intervention of the Legislature, satisfactory to all interests. Should not this prove to be the case during the existence of the charter, there is yet ample time for your petitioners to come before future Legislatures, for a decision on their application, it being near three years and an half before it expires.

Banking associations, it is fair to presume, will provide all needed increase of banking capital, required by the demands of business, in that portion of the city where this institution is located. And although the private interests of its stockholders might be benefitted by an increase of capital, the Legislature, in the proper discharge of its duty, can only look to the public interest. As your committee would recommend no innovations upon the chartered banks, so would they advise no extension of that system, not demanded by absolute necessity, in reference to the public and private interests involved. They can perceive no reason why an increase of capital to existing banks, would not be equivalent to the charter of new banks, neither of which would they recommend the Legislature to grant.

Under all the circumstances of the present time, the banking policy of the State is too unsettled, in the opinion of your committee, to warrant any legislative action on subjects relating to it, that can be postponed without public or private inconvenience. This they think an application of that character. They therefore ask leave to introduce the following resolution.

Resolved, That it is inexpedient to grant the prayer of the petitioners.

No. 267.

IN ASSEMBLY,

March 1, 1839.

REPORT

Of the Canal Commissioners, on a resolution from
the Assembly.

“ STATE OF NEW-YORK, }
In Assembly, February 27, 1839. }

“ *Resolved*, That the Canal Commissioners inform this House, at how early a day it will suit their convenience to report to this House under the resolutions of inquiry, relative to the expenses, &c. of the Erie, Genesee Valley and Black River canals.

“ By order.

“ J. N. LAKE, *Clerk*.”

The Canal Commissioners having received the above resolution, in answer thereto respectfully state, that on the receipt of the resolutions mentioned in the above, they immediately took measures to enable them to give answers to the several inquiries contained in them, at as early a day as was practicable. For that purpose they furnished copies of the resolutions, to each of the chief engineers employed on the canals mentioned in the resolutions; and requested those of them not then in the city, to attend here immediately, and with those already here, to assist the commissioners in answering the inquiries addressed to them. Some of the engineers that were written to have arrived; and the others are expected in a few days. The probability is, that in the course of two or three weeks answers to the resolutions can be prepared, as far as they can be given at the present session of the Legislature. Some of the inquiries in the resolutions, cannot be satisfactorily answered, without having surveys and estimates made, that cannot in any

probability be done during the present session of the Legislature. Other inquiries in the resolutions do not appear to the Commissioners to be susceptible of any other than conjectural answers.

The Commissioners attend a session of the Canal Board every day, in the hearing of claims, appeals and the transaction of such other business as comes before that Board. This part of their duty cannot be neglected, without great inconvenience to parties and witnesses in attendance before that Board. They have besides, much other official business necessarily requiring the principal part of their time, when not sitting as members of the Canal Board: But they intend, with the assistance of the engineers in the employ of the State, to proceed with all practicable diligence to answer, as far as they can, the inquiries made of them in the resolutions.

The Commissioners are willing at all times to communicate to the Legislature, all the information they possess in relation to the public works under their charge.

Respectfully submitted.

JONAS EARLL, JUN.
W. C. BOUCK,
JOHN BOWMAN.
WILLIAM BAKER,

February 28, 1839.

STATE OF NEW-YORK.

No. 268.

IN ASSEMBLY, February 15, 1839.

ANNUAL REPORT

Of William Gary, an Inspector of Beef and Pork
for the county of Rensselaer.

TO THE LEGISLATURE OF THE STATE OF NEW-YORK.

Return of provision inspected by William Gary, inspector of beef
and pork for the county of Rensselaer, N. Y. from 1st January, 1838,
to 1st January, 1839.

Brls.	Price per brl.	Value.
3,852 mess beef,	\$15 00	\$57,780 00
2,373 prime beef,	11 00	26,103 00
26 mess beef,	14 00	364 00
9 prime beef,	10 00	90 00
26 mess pork,	23 00	598 00
3 thin mess pork,	17 00	51 00
6,289		\$84,986 00
4 sorted and packed extra mess beef,	\$17 00	68 00
210 do do half brls. family beef, ..	9 00	1,890 00
6 do do retail pork,	15 00	90 00
362 do do refuse beef,	7 00	2,534 00
		\$89,568 00
<hr/>		
Fees for inspecting 6,260 brls. beef at 15 cents per brl.		\$939 00
do do & overhauling pork, 29 brls. at 25 cts.		7 00
		\$946 25

WILLIAM GARY, *Inspector.*

Troy, January 1st, 1839.

[Assem. No. 268.]

IN ASSEMBLY,

February 28, 1839.

REPORT

Of the Canal Commissioners, on the petition of
William Brayton and others.

The Canal Commissioners, to whom the petition of William Brayton and others was referred, “for their opinion thereon; and that they be requested to inform the Assembly, whether the State now keeps in repair any and what part of the canal fences built by the State; and whether the State did for any and what period keep the said fences, or any and what portion thereof in repair; and if any portion thereof once kept in repair by the State are not now so kept in repair, to give the reason for such change. And also whether the damages on any and what part of the canals were appraised to the owners of farms and others, with reference to the said fences being kept in repair by the State,” submit the following

REPORT:

This subject has, on several occasions, been presented to the Commissioners by reference either from the Senate or the Assembly. It has also been before the Canal Board, and several reports thereon are now to be found in the printed documents. To these the Commissioners respectfully refer the Assembly. They are a report of the Canal Commissioners, made in answer to a reference from the Assembly of the petition of a part of the present petitioners, which will be found in Assembly Documents of 1829, No. 156; a report of the Canal Commissioners, in Assembly Documents of 1830, No. 334; report of the Canal Board, in Senate Documents of 1833, No. 30; and a report of the Canal Board, in Assembly Documents of 1836, No. 234.

It may now be said that the State does not keep in repair any of the canal fences.

Fences were originally constructed by the State on the whole length of the Erie and Champlain canals. On the Erie canal they were at a very early period left to be kept up by the owners of farms, or suffered to decay as they might think proper. On the Champlain canal, the effort to maintain fences was continued somewhat longer, but also abandoned about the year 1827, or about two years after the appraisalment of damages on that canal.

At the time of the appraisalment on the Champlain canal, the State being then in the practice of repairing the fences, it is probable that in some instances, where the question was at all agitated, owners of farms entertained the impression that the State would continue to pay these expenses, but as these fences were then comparatively new and little difficulty had occurred in relation to them, it is not probable that much was said on the subject.

The circumstance of these appraisments being made under an expectation that the State would continue to maintain the fences, is by no means conclusive that the owner of the land is entitled to damages on account of the omission of the State to do so. The benefit of the canal may be far greater than all his damages, including the maintenance of fences. During the long time that has elapsed since the State declined to repair fences, the ownership of many of the farms along the canal has been changed. The present owners in such cases must have come into possession, with a knowledge that the State did not make these repairs, and this must have had its influence on the consideration paid. Equity would hardly require of the State, an indemnity against a burden which the owner had taken upon himself under such circumstances.

The reasons which influenced the Commissioners, in determining to abandon the maintenance of fences on the canals, are fully explained in the reports before referred to.

WILLIAM BAKER.

WM. C. BOUCK,

JONAS EARLL, JUNIOR,

JOHN BOWMAN,

February 27th, 1839.

STATE OF NEW-YORK.

No. 270.

IN ASSEMBLY,

February 27, 1839.

REPORT

Of the committee on ways and means, on a resolution of the 6th inst. relative to moneys loaned to citizens of this State.

Mr. Davis, from the committee on ways and means, to which was referred a resolution passed on the 6th inst., instructing said committee to inquire into and report upon the expediency of providing by law, that the time for the payment to the State of the loans to the people thereof of 1792 and 1808, which become payable on the first Tuesday of May next, shall be further extended, and provision made that the ultimate payment of said loans may be by annual instalments,

REPORTS:

That of the moneys authorized to be loaned by virtue of the act entitled "An act for loaning moneys belonging to this State," passed March 14, 1792, there is now outstanding the sum of \$150,981.58; and of the moneys authorized to be loaned by virtue of the act entitled "An act authorizing a loan of moneys to the citizens of this State," passed April 11th, 1808, there is outstanding the sum of \$232,106.06. The loans were originally authorized to a much larger amount. The time of payment has repeatedly been extended, and the last act for that purpose was passed on the 30th of March, 1829. The latter act continues in force the first section of the act of March 30, 1821, until the first Tuesday of May next, and makes it the duty of the several loan officers and commissioners of loans, mentioned in said act, to receive any principal moneys loaned by them, which any person may be desirous of paying; and instead of re-loaning such principal moneys, to pay the same into the treasury of the State.

The moneys loaned by virtue of the acts aforesaid, form part of the Common School Fund, which, under the act of the last session of the Legislature, will be greatly increased. A large amount of that fund is now uninvested, although the importance of the object to which its revenue is devoted, demands that the whole capital should be kept active. The committee are not aware of any reason why the time for the payment of principal should not be further extended, in all cases where the security for the loans is perfectly satisfactory to the loan officers or commissioners for loaning money. So much of the second section of the act of 1829, as requires said officers to pay the moneys, by them received for principal on the loans above mentioned, into the treasury of the State, was repealed by an act passed May 25, 1836, and they were authorized to reloan the same agreeable to the provisions of the acts creating such loans. The practice under the act of 1829, as the committee are advised by the Deputy Comptroller, has been, to receive from those indebted any part of the principal which they were desirous of paying. It is the opinion of the committee that the act last mentioned, answers the latter part of the inquiry contained in the resolution above mentioned, and that no further provision is necessary to enable the persons indebted to make their payments by annual instalments, if the laws now existing be continued in force. The committee ask leave to introduce a bill.

No. 271.

IN ASSEMBLY,

March 1, 1839.

REPORT

Of the New-York and Erie Rail-Road Company,
giving a list of the Stockholders, &c.

*Office of the New-York and Erie Rail-Road Co. }
New-York, 25th February, 1839. }*

SIR—

In conformity with the request contained in the resolution passed on the 18th February inst. by the honorable House of Assembly, I am directed to make the enclosed report. And have the honor to remain,

Respectfully, your obd't serv't,

T. J. WATERS, *Secretary.*

Hon. G. W. PATTERSON,

Speaker of the Assembly.

LIST OF STOCKHOLDERS, &c.

Names and residence.	No. of shares.	Amount paid.
Astor, William B. New-York,	75	\$1,125 00
Astor, John Jacob, do	150	2,250 00
Arnot, John, Chemung co.	2	11 00
Allen, Joseph W. Brooklyn, ..	50	750 00
Alley, Samuel, New-York,	20	300 00
Austen, David, do	100	1,500 00
Allen, Moses, do	200	1,000 00
Addoms, Charles,	10	50 00
Ayres, Daniel, New-York,	10	150 00
Aymar, B. do	10	150 00
Allen, Joseph,	5	50 00
Anderson, Robert,	10	150 00
Adams, Charles,	1	15 00
Adams, Roswell,	3	45 00
Austin, John P. New-York,	10	150 00
Burnham, Michael, do	101	1,515 00
Burtsell, John L. do	20	100 00
Bucknor, William G. do	100	1,250 00
Berney, Robert, do	200	3,000 00
Boorman, James, do	100	1,500 00
Blauvelt, Cornelius, J. Rockland co.	190	2,850 00
Blauvelt, John G. do	5	75 00
Bull, Marcus, New-York,	100	500 00
Bridges, Joseph F. do	10	150 00
Beach, Hunn C. do	40	600 00
Bond, T. J.	100	500 00
Bruen, George W. New-York,	200	2,500 00
Barron, Thomas, do	100	1,500 00
Bayard, Robert, (trustee), do	50	750 00
Bolton, Curtis, do	10	150 00
Birdsall, Benjamin, do	5	75 00
Benedict & Wetmore, do	40	600 00
Ballard, William, do	2	30 00
Buck & Sons, Gurdon, do	30	450 00
Boulard, Stephen V. do	20	300 00

Carried forward,

\$

Names and residence.	No. of shares.	Amount paid.
Brought forward,		\$
Bailey, Keeler & Remsen, New-York,	50	500 00
Blanche, Lewis, do	10	50 00
Bowen, George,	20	100 00
Bloodgood, Nathaniel, New-York,	20	300 00
Booraem & Co. do	15	225 00
Brugiere & Co. Charles, do	5	75 00
Brown & Co. Silas and Jeremiah, New-York,	10	150 00
Brooks, George, do	5	75 00
Brooks, James, do	5	75 00
Brooks, William, do	5	75 00
Brady, William V. do	5	50 00
Bussing, E. & J. do	10	150 00
Boyd, John J. do	10	150 00
Baldwin, Phelps & Co. do	20	300 00
Benson, E. & J. Lefferts, do	10	150 00
Boyd, James, do	20	300 00
Bull, Thomas, jr. do	5	75 00
Bergh & Arcularius, do	5	75 00
Bostwick & Taylor, do	10	150 00
Brower, Richard D. jr.	6	30 00
Boeuf, Joseph,	10	125 00
Beekman, H. New-York,	40	600 00
Brett & Doremus, do	10	150 00
Baker, Johnson & Co. do	5	75 00
Burgess, John W. do	20	300 00
Barstow & C. C. & J. do	10	150 00
Brown, Brothers & Co. do	81	1,215 00
Benjamin & Co. M. D. do	95	1,425 00
Boyd, Heard & Bryan, do	10	150 00
Bolton, Curtis E.	5	75 00
Blunt, E. & G. W. New-York,	10	150 00
Beach, Daniel, do	5	75 00
Bard, William, do	10	150 00
Bloodgood, S. D. Albany,	15	225 00
Brown, John A. Philadelphia,	19	285 00
Brewster, Frederick H. o.	1	15 00
Bosworth, Joseph, b.	1	15 00
Barnaby, James, c.	5	75 00
Carried forward,		\$

Names and residence.	No. of shares.	Amount paid.
Brought forward,		\$
Beggs Charles, c.	5	62 50
Brown, Samuel A. c.	10	100 00
Barker, Job, c.	1	12 50
Bly, Theron S. c.	2	30 00
Beebee, Jeremiah S. Ithaca,	5	75 00
Beach, A. W. s.	1	15 00
Besley, Samuel, s.	2	30 00
Bull, W. H. s.	30	450 00
Bissell, J. W. s.	10	150 00
Briscoe, John, s.	1	10 00
Brown M. H. s.	1	15 00
Butler, Charles, s.	25	125 00
Brother, Henry, s.	5	75 00
Balcom, Lyman, s.	3	45 00
Bicker, Walter, New-York,	100	500 00
Brooks, Brothers & Co. do	17	255 00
Beggs, John, c.	5	62 50
Chesebrough, Robert, New-York,	100	1,500 00
Cutting, F. B. do	100	1,500 00
Chichester, Abner, do	20	300 00
Coit, Levi, do	100	500 00
Comstock & Andrews, do	50	750 00
Cochran, Samuel,	5	62 50
Crocker & Williams, New-York,	10	150 00
Churchill, Southmayd & Co. do	10	150 00
Clark, Smith & Hyde, do	10	150 00
Chevrolat, Freres & Co. do	10	150 00
Cook & Co. Levi, do	3	45 00
Coddington, J. J. do	25	375 00
Chardavoyne, W. & T. C. do	5	75 00
Coster, John G. do	200	3,000 00
Conant, F. J. do	5	75 00
Cushman & Co. D. A. do	20	300 00
Cleaveland, E. W. do	5	75 00
Catlin, John M. do	125	1,875 00
Coit, W. A. do	10	125 00
Curtis, L. & B. do	25	375 00
Chazournes & Paillet, do	10	150 00
Carried forward,		\$

Names and residence.		No. of shares.	Amount paid.
Brought forward,			\$
Cowper Mary Ann,		10	150 00
Clark, James B. New-York,.....		10	50 00
Clark, Richard S. do		10	150 00
Coster, Gerard H. do		25	375 00
Cornell, T. F. do		5	75 00
Chastelain & Pomert, do		10	150 00
Cary & Co. W. H. do		5	75 00
Cutting, Brothers, do		10	150 00
Corlies & Denison, do		5	75 00
Crook, Samuel, do		10	150 00
Chesebrough, R. & H. do		30	450 00
Crane, John S. o.		2	30 00
Collins, John A. b.		5	75 00
Chester, Walter, c.		10	100 00
Cowing, John K. c.		1	10 00
Chamberlain, Benjamin, c.		55	575 00
Collin, John B. s.		2	30 00
Cook, Paul C. s.		5	75 00
Cronch, Caleb, s.		10	150 00
Cook, Constant, s.		10	150 00
Campbell, R. jr. s.		5	75 00
Case, Abijah B. s.		1	15 00
Cooper, John, jr. s.		10	150 00
Corbin, Alvin, s.		1	15 00
Craft, Benjamin F. c.		2	30 00
Clark, States N. c.		10	150 00
Dederer, Isaac M. Rockland co.		20	300 00
Dudgeon, T.		10	50 00
Devereux, Nicholas, Utica,		50	750 00
Doremus, Suydam & Nixon, New-York,		100	1,500 00
Duchamp, Eugene, New-Jersey,		100	1,000 00
Doig, Peter,		2	10 00
Devoe, Mary, Detroit,		2	10 00
Dorr & Co. S. & F. New-York,.....		50	750 00
Depew, Joseph, do		5	75 00
Davis, Thomas E. do		100	1,500 00
Dow & Co. Josiah, do		5	75 00
Depeyster, Frederick, do		20	300 00
Carried forward,			\$

Names and residence.	No. of shares.	Amount paid.
Brought forward,		\$
Dusenbury, H. O. New-York,	5	75 00
Dubois & Co. Cornelius, do	20	300 00
Delafield, John, do	100	1,500 00
Dudley & Stuyvesant, do	100	1,000 00
Dunnell, Henry G. do	5	75 00
Duer, John, do	50	750 00
Davenport, Ira, s.	150	2,250 00
Dobbin, Ann, o.	3	45 00
Dickinson, Daniel S. b.	5	75 00
Doubleday, John T. b.	2	30 00
Davis, Levi, s.	2	30 00
Davis, Redmond S. s.	1	15 00
Davis, Daniel H. s.	10	150 00
Embury, Philip,	10	150 00
Erlacher, Andris,	1	10 00
Elliott, N. J. New-York,	23	345 00
Evans & Carman, do	5	75 00
Elliott, H. H. do	50	750 00
Eldridge, Christopher, b.	10	150 00
Ely, Elihu, b.	5	75 00
Everett & Battelle, New-York,	10	150 00
Fish, Hamilton, do	21	315 00
Freeborn, Gideon, do	5	75 00
Fisher, Leonard, do	24	360 00
Franklin & Co. David, do	20	100 00
Franklin, David, do	20	100 00
Furst, George A. do	25	375 00
Francis, John W. do	20	300 00
Foster, Easton & Co. do	20	300 00
Fryer, Isaac, do	10	100 00
French, George A. c.	25	250 00
Foote, Elial T. c.	10	50 00
Falconer, Robert, c.	10	125 00
Fairman, F. F. New-York,	11	165 00
Goetchins, Cornelius,	1	12 50
Gossler, John N. New-York,	300	4,500 00
Grosvenor, S do	10	150 00
Gordon, George, do	50	750 00
Carried forward,		\$

Names and residence.	No. of shares.	Amount paid.
Brought forward,		\$
Gurnee, John S.	5	75 00
Gurnee, Daniel S.	25	375 00
Gross, Francis, New-York,	10	150 00
Glover, John, do	100	1,500 00
Gebhard, F. do	50	750 00
Gross, John L. do	5	75 00
Garcia, John P. do	10	150 00
Gordon, J. A.	5	50 00
Griswold, N. L. & G. New-York,	200	3,000 00
Granger, Birch & Co. do	10	150 00
Gascoigyne, J. & C. do	5	75 00
Griswold, Edward,	10	150 00
Green & Wetmore, New-York,	10	50 00
Glass, Ann, do	60	900 00
Green, William P. Norwich, Conn.	300	4,500 00
Gracie, William R. Jamaica, L. I.	100	1,500 00
Gracie, Archibald, New-York,	10	150 00
Graves, Boonen & Co. do	20	300 00
Goodrich, Joseph, s.	1	5 00
Graves, Charles, s.	1	15 00
Gansevoort, J. R. s.	10	100 00
Greenfield, J. V. New-York,	20	300 00
Humphrey, Solomon,	1	5 00
Hewing, David P.	1	5 00
Harmony, Peter, New-York,	200	3,000 00
Holt, Henry, do	10	150 00
Hoyt, Goold, do	1,000	15,000 00
Hoyt, Charles, Brooklyn,	1,000	15,000 00
Haggerty, John, New-York,	100	1,500 00
Henriques, Joseph, do	50	750 00
Hope, Reuben, do	5	75 00
Hadden, David, do	64	960 00
Hills, H. W. & S. do	100	1,500 00
Hoit, Moore, do	5	75 00
Howe, Benjamin F. do	10	150 00
Hyde, Hickocks & Greenman, New-York, ..	20	300 00
Hagarty, James, do ..	25	250 00
Halsted, Haines & Co. do ...	50	750 00
Carried forward,		\$

Names and residence.	No. of shares.	Amount paid.
Brought forward,	\$	
Hepburn, Louisa H.	4	60 00
Hull, William, New-York,	5	75 00
Hutton, Benjamin H. do	10	150 00
Hubbard & Co. N. J. do	25	375 00
Harrison, Richard F. do	10	150 00
Holmes, Baily & Co. do	20	300 00
Healy, Samuel, do	10	125 00
Haniott, James, do	5	75 00
Herrick, E. & J. do	10	150 00
Haydock, Robert, do	10	150 00
Heyer, Cornelius, do	200	3,000 00
Hance & Co. Revo, do	5	75 00
Haven & Co. do	20	300 00
Hoffman, L. M. do	10	150 00
Henderson, R. S.	10	150 00
Howland, G. G.	50	750 00
Heckscher, Charles A. E. New-York,	50	750 00
Hotaling, S. & W. do	5	75 00
Hogins, Andrew H. do	25	375 00
Henriques, J. M. do	100	1,500 00
Heard, Hester, o.	2	30 00
Hanley, A. c.	10	100 00
Hasbrook, Benjamin, New-York,	10	150 00
Hazeltine, Abner, c.	3	37 50
Howell, William, s.	2	30 00
Howell, E. s.	5	75 00
Haverling, George, s.	5	75 00
Haverling, Adam, s.	5	75 00
Hubbell, W. S. s.	10	125 00
Irving, Guy C. c.	20	250 00
Joly, J. A. New-York,	20	300 00
Jones, David S. Long-Island,	200	3,000 00
Jones, Charles,	2	20 00
Johnson, Charles F.	5	62 50
Johnston, Sarah C.	2	30 00
Johnson, Sons, John, New-York,	10	150 00
Jacquelin, J. M. do	10	150 00
Joseph & Co. J. L. do	100	1,500 00
Carried forward,		\$

Names and residence.		No. of shares.	Amount paid.
Brought forward,			\$
Jenkins, Edgar,	New-York,	25	250 00
Johnston, John,	do	100	1,500 00
Johnson, William S.	do	20	300 00
Johnson, W. E.	do	10	150 00
James, William & John,	do	5	75 00
Keeler, McNeil & Co.	do	10	150 00
Kneeland, Henry,	do	50	750 00
Keep, Henry,	do	10	150 00
King, John A. Jamaica, L. I.		100	1,500 00
King, James G. Highwood, N. J.		500	7,500 00
King, George R.		2	30 00
Kidder, Isaac S. s.		5	75 00
King, Charles C. New-York,		300	4,500 00
King, John, Pennsylvania,		1	15 00
Kelsey & Co. C. & G. H. New-York,		25	250 00
Kelly & Co. J. & W.	do	30	450 00
Lawrence, Richard M.	do	3	45 00
Lawrence, William Beach,	do	150	2,250 00
Lord, Edwin	do	178	2,670 00
Lord, Eleazer, Rockland co.		901	13,515 00
Lord, Rufus L.	New-York,	420	6,300 00
Lord, David N.	do	3,100	41,250 00
Lee, James,	do	10	150 00
Labagh, John J.	do	5	75 00
Leavitt, J. W. & R.	do	50	750 00
Lydig, David,	do	100	1,500 00
Lawrence, W. A. & Munsell, New-York,		20	300 00
Lockwood, A.	do	5	75 00
Lopes, S. C. M.		2	30 00
Laverty, Henry,	New-York,	25	375 00
Lee, Dater & Miller,	do	20	300 00
Lloyd, John,	do	10	150 00
Lawrence & Beardsley,	do	5	75 00
Little, Shaw & Co.	do	10	150 00
Lockwood, John & Walter, New-York,		10	150 00
Langdon & Andrews,		10	100 00
Leet, Allen N.		10	50 00
Lord, Daniel jr. New-York,		10	150 00

Carried forward, \$

Names and residence.	No. of shares.	Amount paid.
Brought forward,		\$
Lott, Jerome,	10	150 00
Lowry, Nathaniel A. c.	20	200 00
Lyman, Samuel P. Utica,	200	3,000 00
Lowry, H. W. c.	20	250 00
Lilly, P. A. s.	1	10 00
Lilly, Jane D. s.	1	10 00
Leland, Z. A. s.	5	75 00
Legro, Samuel, s.	1	15 00
Lyon, Moses H. s.	5	50 00
Manning, John, Rockland co.	5	75 00
McLean, Hugh, New-York,	40	600 00
Moffat, Anthony, do	3	45 00
Maury, M. do	20	300 00
McVickar, Benjamin, do	100	1,500 00
Mitchell, William, do	5	75 00
Marsh, Samuel, do	10	150 00
McConochie, Alexander,	5	50 00
McNeven, W. James, M. D. New-York,	50	750 00
Murray, Mary, do	25	250 00
Murray, Hannah, do	25	250 00
Masterton & Smith, do	15	225 00
Murray, James B. do	25	375 00
Mills & Co. do	10	50 00
Moore & Jackson, do	6	90 00
Morrison & Co. W. & J. do	20	300 00
Mead, Stafford & Co. do	5	75 00
Manning & Co. J. & C. J. do	5	62 50
Milford, Edward, do	10	100 00
Mercein, Thomas R. do	50	750 00
Mead & Co. Ralph, do	10	150 00
Mead, Rogers & Co. do	10	150 00
Maynard, Arba K.	75	937 50
Martin, J. J.	5	75 00
Merriam & Smith, o.	2	30 00
Monell, Charles, o.	10	150 00
Murdock, Carey, b.	5	75 00
Merrill, Myron, b.	5	75 00
Mullett, Ernest, c.	10	125 00

Carried forward

\$

Names and residence.		No. of shares.	Amount paid.
Brought forward,			\$
Martin, F. S.		10	150 00
Marshall, O. F. s.		5	75 00
Masten, J. G. s.		3	30 00
Magee, T. J. s.		10	150 00
May, S. S. s.		1	15 00
May, James, s.		1	10 00
McCay, W. W. s.		5	75 00
Magee, John, s.		20	300 00
Morgan, Enoch, New-York,		10	150 00
Morris, Gouverneur, Westchester co.		50	750 00
Merrill, Corlies & Stanton, New-York,		10	150 00
Meier & Co. Caspar, do		30	450 00
Moses, Lorenzo, do		2	30 00
Minturn & Co. R. R. do		10	150 00
McLean, Thomas M. do		5	75 00
Nelson, Carleton & Co. do		10	150 00
Nevins, Townsend & Co. do		600	9,000 00
Norwood, A. S. do		50	750 00
Nevins & Co. R. L. do		200	2,500 00
Nanny, Joseph, o.		4	60 00
Nixon, G. C. s.		1	15 00
Norrie, A. New-York,		50	750 00
Otis, Joseph, do		50	750 00
Ogden, Ferguson & Co. do		100	1,500 00
Olmstead, Ralph, do		10	150 00
Olcott, H. W. do		10	150 00
Pierson, Jeremiah H. Rockland co.		151	2,265 00
Pierson, Josiah G. do		1	15 00
Price, Edward,		40	200 00
Phillips, Eliza G.		20	100 00
Pearson, Isaac Green, New-York,		180	2,700 00
Ponnett, Henry,		100	1,500 00
Pierpont, Hezekiah B.		25	375 00
Phelps, Anson G. New-York,		50	750 00
Peck, Elisha,		50	750 00
Palache, M.		50	750 00
Pike, Moses, S. New-York,		15	225 00
Porter, D. C. do		5	75 00
Carried forward,			\$

Names and residence.	No. of shares.	Amount paid.
Brought forward,		\$
Paulet, Venrie,	10	150 00
Pomeroy & Bull, New-York,	5	25 00
Peet & Co. F. T. do	5	75 00
Prime, Edward, do	290	4,350 00
Patterson, M. C. do	10	150 00
Pumpelly, James, Owego,	10	150 00
Pierson, Henry,	10	150 00
Page, Julius, b.	5	75 00
Parsons, Levi, c.	10	150 00
Patchen, Warren, s.	10	150 00
Patchen, Warren jr. s.	2	30 00
Pelton, Henry, Orange co.	10	150 00
Perit, Pelatiah, New-York,	100	1,500 00
Rockwell, William,	20	300 00
Redfield, William C. New-York,	10	100 00
Redmond, William, do	20	300 00
Russell & Co. Chas. H. do	100	1,500 00
Rogers, Ketchum & Grosvenor, New-York, ..	100	1,500 00
Russell, Samuel,	100	1,500 00
Rankin, Henry, New-York,	30	450 00
Robbins & Painter, do	30	450 00
Root & Leonard, do	50	750 00
Roome, Samuel do	5	75 00
Ray, Robert, do	100	1,500 00
Ray, Richard, do	100	1,500 00
Rhodes, Weed & Co. do	20	200 00
Robie, Reuben, s.	10	125 00
Rogers, H. W. s.	3	30 00
Russell, Samuel,	5	75 00
Richards, Guy, New-York,	25	312 50
Rodman, Washington H, do	100	1,500 00
Russell, Archibald, do	5	75 00
Rogers, W. C. do	1	15 00
Sloat, Stephen, Rockland co.	1	5 00
Sumner & Naylor, New-York,	5	75 00
Stagg & Co. John P. do	10	150 00
Sloat, Jacob, Rockland co.	5	75 00
Stuyvesant, Peter G. New-York,	150	2,250 00
Carried forward,		\$

Names and residence.		No. of shares.	Amount paid.
Brought forward,			\$
Smith, Charles, J.	New-York,	5	75 00
St. John, Charles,	do	10	150 00
Stebbins, J. W.	do	50	250 00
Sylvester, S. J.	do	30	150 00
Suydam, John,	do	50	750 00
Smith, Edmund,	do	50	750 00
St. John, Samuel, Connecticut,	.....	100	1,500 00
Sergeant, Thomas, New-York,	.....	100	1,000 00
Stewart, T. D. Mobile,	.....	5	50 00
Smith, Henry M.	New-York,	20	100 00
Squire, Charles,	do	50	250 00
Schuyler, R. & G. L.	do	10	150 00
Stagg, John P.	do	1	15 00
Suydam, Lambert,	do	20	300 00
Storms, Peter,	do	2	30 00
Seymour, James M.	do	8	120 00
Swartwout, Samuel,	.....	50	750 00
Simpson, L. H.	New-York,	10	150 00
Sackett, E. B. & W. H.	do	10	150 00
Suydams & York,	do	10	100 00
Stewart & Spring,	do	10	50 00
Suffern, Thomas,	do	10	150 00
Shipman, George P.	do	100	1,250 00
Shutlif, W. A.	do	2	20 00
Scott, Shapter & Morrell,	do	50	750 00
Sinclair, William,	do	15	225 00
Sedgwick, Robert,	do	20	300 00
Schultz H.	do	10	50 00
Stebbins, Brothers,	do	50	250 00
Seaman, Van Slyck & Norton, New-York,	..	25	375 00
Scriber, Hitchcock & Co.	do ..	10	150 00
Staples & Clark,	do ..	10	150 00
Swain, William M. Pennsylvania,	.....	40	600 00
Suydam & Reed,	New-York,	20	300 00
Skidmore & Wilkins,	do	5	75 00
Stevens, John,	.....	200	1,000 00
Seymour, Celim L.	.....	5	75 00
Stevens, John A. New-York,	.....	50	750 00
Carried forward,			\$

Names and residence.		No. of shares.	Amount paid.
Brought forward,			\$
Sargeant, H. W.	New-York,	10	150 00
Suydam, Sage & Co.	do	10	150 00
Spies, Adam W.	do	5	75 00
Schlesinger, F. S. & P.	do	10	150 00
Satterthwait, Thos. W.	do	50	750 00
Shipman & Ayres,	do	25	375 00
Seaton, John,		40	600 00
Sanford, H. J. New-York,	.....	10	150 00
Sherwood, Joseph E. o.		6	90 00
Strong, Cyrus, b.		5	75 00
Smith, Walter, c.		150	1,875 00
Starr, Seth, c.		5	50 00
Sears, Nathan L. c.		1	10 00
Scott, W. H. s.		1	10 00
Stephens, Alexander H. s.		1	15 00
Stewart, Joseph E. s.		5	25 00
Stone, Asaph,	New-York,	25	375 00
Tanner, Abraham,	do	15	225 00
Townsend & Brothers,	do	20	300 00
Tiffany, Anderson & Co	do	50	750 00
Thomson, Samuel,	do	25	375 00
Tappan & Co. Arthur,	do	50	750 00
Townsend, Eliza,	do	10	150 00
Townsend, Eliza, N.	do	10	150 00
Townsend, Mary,	do	10	150 00
Townsend, Russell N.	do	10	150 00
Townsend, Frederick,	do	10	150 00
Townsend, George,	do	10	150 00
Thompson, M. F.	do	5	75 00
Tucker, Joseph,	do	10	150 00
Titus, Henry W.	do	5	75 00
Tyson & Co. George W. do	.....	25	125 00
Theriat Augusts R.	do	5	75 00
Talman, John H.	do	20	300 00
Tracy & Gould,	do	15	225 00
Tallmadge Daniel B.	do	10	150 00
Tallmadge, H. F.	do	10	150 00
Tucker & Dorr,	do	30	450 00
Carried forward,			\$

Names and residence.	No. of shares.	Amount paid.
Brought forward,		\$
Tenney, Caleb, J.	5	75 00
Ten Eyck, M.	20	300 00
Trimble, George T. New-York,	10	150 00
Thompson, Abijah W. o.	2	30 00
Tinker, E. L. c.	5	50 00
Townsend, Henry, s.	5	50 00
Underhill, Richard T. New-York,.....	50	750 00
Velazquez, Marlano de la Cadena,	5	25 00
Van Nest, Abraham, New-York,	10	150 00
Van Antwerp & Co. Wm. do	5	75 00
Van Wagenen, Herbert, do	25	375 00
Van Antwerp, L. do	5	75 00
Van Pelt & Fowler, do	5	75 00
Van Brunt, Nicholas, do	5	75 00
Van Beuren, James, c.	25	250 00
Whitney, Stephen, New-York,.....	200	3,000 00
Woolsey, William W. do	200	3,000 00
Wickes, Eliphalet,	200	3,000 00
Whitney, Asa, New-York,	25	375 00
Wheeler, Henry Godfrey,	5	75 00
Winthrop, Benjamin R. New-York,.....	60	900 00
Willis & Brothers, do	10	150 00
Wilkins, Governor M. do	50	750 00
Whiting, William E. do	10	150 00
West, N. W. do	40	600 00
Whitall, J. D. W. do	5	75 00
Ward, Richard R. do	50	750 00
Warren, John, do	50	750 00
Whittemore, Samuel, deceased,	100	500 00
Woodruff, P. H. New-York,	10	150 00
Wagstaff, William,	5	62 50
Weed, Harvey, New-York,.....	10	150 00
Wolfe & Clarks, do	10	150 00
Williams & Bogart, do	5	75 00
Wetmore & Co. do	10	150 00
Wardell & Co. C. & R. do	20	300 00
Ward & Co. John, do	100	1,500 00
Ward, Thomas,	1	5 00
Carried forward,		\$

Names and residence.		No. of shares.	Amount paid.
Brought forward,			\$
Ward, Samuel,	New-York,	410	6,025 00
Wright, Winston & Stebbins,	do	10	150 00
Wyckoff & Brown,	do	10	150 00
Wotherspoon, Thomas,	do	5	75 00
Waters, T. J. trustee, &c.	do	230	3,450 00
Whitman, M. W.	do	70	1,050 00
Wright, Mary,	do	1	15 00
Wait, Edward, o.		5	75 00
Webb, Moses, o.		1	5 00
Webster, M. H.		5	75 00
Wisner, Jeffry, o.		4	60 00
Wickham, George D. o.		20	300 00
Whitney, Virgil, b.		10	50 00
Whitney, Joshua, b.		5	75 00
Waterman, Thomas, G. b.		5	75 00
Williams, Ezra, c.		10	100 00
Williams, Daniel, c.		2	30 00
Wagner, F. R. s.		1	15 00
Wheeler, George, s.		1	5 00
Whiting, John,		2	30 00
Waddington, Joshua, New-York,		100	1,500 00
Walker, Joseph,	do	50	625 00
Walsh & Mallory,	do	10	150 00
		24,997	\$348,737 50

NOTE.—*b.* Subscribed at the Broome County Bank.
c. “ “ Chautauque County Bank.
o. “ “ Orange County Bank.
s. “ “ Steuben County Bank.

I, Talman J. Waters, secretary of the New-York and Erie Railroad Company, do hereby certify, that the foregoing statement truly sets forth the names of the stockholders of said company; the places of their residence, so far as is to me known, the amount of stock held by each, and also the amount paid on such stock. And I further certify, that none of the payments therein stated, or any portion of the same, have been made in lands; but that the whole amount thereof, has been paid in *cash* exclusively.

T. J. WATERS,

Secretary of the New-York and Erie R. R. Co.

New-York, February 25, 1839.

STATE OF NEW-YORK.

No. 272.

IN ASSEMBLY,

March 4, 1839.

REPORT

Of the select committee, on a resolution from the Senate, relative to the appointment of an United States Senator.

Mr. Lawrence, from the select committee to which was referred the resolution of the honorable the Senate, proposing "that Samuel Beardsley be, and he is hereby chosen a Senator to represent this State in the Congress of the United States, in the place of Nathaniel P. Tallmadge, whose term of service will expire on the third day of March next,"

REPORTS:

Your committee have delayed their report in the hope that it would become unnecessary, by the action of the Honorable the Senate upon the bill, which passed this House on the eighth day of February last, providing for the event which has happened, of a failure by the two Houses to meet together and compare their nominations of a Senator to Congress.

That bill was transmitted to and received by the Senate before the resolution referred to your committee came to this House. That comity which should always prevail between the two Houses, and the presumption which should always be indulged, so long as it can be, that each house will perform every duty assigned to its members by their constituents, induced your committee to postpone any report until abundant opportunity should be given to the Senate to act upon the bill sent to them by this House. Your committee also indulged the hope, that time would soothe the feelings which have been excited on the occasion of

choosing a Senator to Congress, and that calm and deliberate reflection would bring all who are conscientiously disposed to perform an imperative duty, to a final agreement in the mode of discharging it. Sufficient time having already elapsed and no action having been had on the said bill, the committee deem it due to themselves, to the House and their constituents, to state some of the reasons why they cannot concur with the Senate in their resolution.

The resolution referred to your committee is, in itself strong evidence of the benign influence of time and reflection, upon the conflicting views and opinions of men. For it appears by the journals of the Senate which your committee have searched, that on the fifth of February last, the day provided by law for the appointment of a Senator in Congress, the members of the Senate were so unfortunately divided in their opinions, respecting the qualifications of any person to represent the State in that exalted station, that eighteen different gentlemen were nominated, so that owing to this extraordinary diversity of opinion, no nomination was made by that Honorable body, and for that reason it refused to meet this House to proceed to a joint ballot. Only four days afterwards, it appears from the resolution referred to your committee, these discrepancies of opinion or of feeling have yielded to the deep sense of official duty, to the republican obligation of obedience to the public will, or to the desire to have this State fully represented in the National Councils, or to all these considerations combined; and the same members whose differences had been carried to such a lamentable extent, united in the choice of the gentleman named in the resolution as the candidate on the part of the Senate. It is much to be regretted, that the pure principles, to which we have alluded as having produced this harmonious result, had not produced their full influence and induced the Honorable the Senate, to offer to this House the candidate whom that body put in nomination, in the manner prescribed by that law, which has been in force during nearly fifty years; which stands at this moment unrepealed on our statute book, and which is as obligatory upon the members of the Legislature as any other law of the land.

Instead of *nominating* the gentleman named in their resolution, and thus giving this House the equal privilege of nominating a candidate on its part; the Senate have sent a proposition absolutely and directly to *appoint* him a Senator in Congress. The effect of this proceeding obviously is to degrade this House from the level of perfect equality with the Senate, in which it is placed by the Constitution, and to give to the Senate the attitude of a superior tribunal, prescribing to an inferior,

the individual and the only individual whom it will consent to elect. There is something so offensive in this view of the subject, and so repugnant to the great principles of republicanism, which we all profess to maintain, that your committee cannot believe that it was deliberately and maturely considered by that Honorable body.

Those who laid the foundation of our glorious institutions intended to substitute a rule for determining differences between those having equal rights, entirely different from any that existed in the old world. They had no confidence in the efficacy of the hereditary wisdom of a prince or of a set of nobles to compose such differences, and trusted still less to the power of the sword. They resolved that the *majority* should govern, and they applied the principle to every case that could occur.

The same principle was, at the very commencement of our own State Government, applied to a case where the action of a legislative body, consisting of two houses was necessary to a result.

By the 30th article of the former Constitution, adopted in 1777, delegates to Congress were directed to be chosen as follows: the Senate and Assembly were each openly to nominate the requisite number, after which they were to meet together, and those persons named in both lists were to be delegates; and out of the persons whose names were not on both lists one half were to be chosen, by the joint ballot of the Senators and members of Assembly so met together.

The patriotic framers of the Constitution conceived it more important to ensure a representation of the State in the Congress than to attempt to preserve a check on the immediate representatives of the people in the House of Assembly, by means of the Senate voting as a separate branch.

They applied the great democratic principle of a majority for that purpose, doubtless on the presumption that there was likely to be as much intelligence and patriotism in one body as the other, and they therefore brought the Senators and members of Assembly together as individuals, and gave to the majority of the meeting thus constituted the power of choosing delegates.

After the adoption of the Constitution of the United States, providing for the election of Senators to Congress by the Legislature of each State, and giving to the several Legislatures the power of prescribing "the times, places and manner of holding elections for Senators and Repre-

sentatives, (section 4 of article 1,) a law was passed by the Legislature of this State, on the 14th January, 1793, directing that Senators to Congress should always be chosen in the same manner that delegates to Congress are directed to be chosen by the Constitution. The vital importance of the legislative duty to keep this State represented in the Senate is here exhibited by the provision which referred it to a majority of the members individually to decide by their ballots, when the two houses disagreed; and here again is the majority principle applied to secure effectually the performance of that great duty. It is remarkable that when this act was under consideration in the Senate Mr. Schuyler made a motion to expunge the words, "*in the same manner that delegates to represent this State in the Congress of the United States of America are directed to be appointed by the Constitution of this State,*" and to substitute the following in their stead, viz: "*By concurrent resolutions of the Senate and Assembly.*"

This motion was negatived; see Senate Journals of December 7, 1792.

The Senators of that day deliberately and intentionally surrendered the power which separate action by the respective houses would give to the Senate, of compelling the selection of its candidates or suffering the State to go unrepresented, and they surrendered it in obedience to the fundamental principle of our institutions, that the will of the majority should prevail.

This bill, after passing both houses, was submitted to the council of revision "for their revisal and consideration," whose special duty it was to determine whether it was proper to become a law.

The history of the past shews that the council examined all bills presented to them with particular reference to their constitutionality; and this bill was returned by them to the Senate with a message that it did not appear improper to them that it should become a law. The council at this time consisted of George Clinton the Governor, Robert R. Livingston chancellor, Robert Yates chief justice, and John Sloss Hobart, John Lansing, jr. and Morgan Lewis, justices of the supreme court.

On the 20th of March, 1801, this act was re-enacted, having been revised by James Kent and Jacob Radcliff, two of the justices of the supreme court, and having been approved by a council of revision then consisting of George Clinton Governor, John Lansing, jr. chancellor, Morgan Lewis chief justice, James Kent and Jacob Radcliff, justices

of the supreme court. The same act was comprised in the Revised Laws of 1813, prepared by John Woodworth, a justice of the supreme court, and William P. Van Ness, subsequently district judge of the United States.

At this time the council of revision consisted of Daniel D. Tompkins Governor, John Lansing, jr. chancellor, James Kent chief justice, Smith Thompson, Ambrose Spencer, William W. Van Ness and Joseph C. Yates, justices of the supreme court.

Whether the old acts collected in that revision were submitted to the council does not appear; they probably were not; still with such men to watch the progress of laws, it is not to be supposed that if they entertained any doubts of its propriety or constitutionality it would be suffered to pass without opposition. The Revised Statutes of 1830 contain the law now in force on this subject. It provides explicitly for the election of a Senator by joint ballot in case of disagreement between the two houses. It is not necessary to refer to the distinguished character of the revisors who prepared that law and gave it the sanction of their recommendation,—they are well known. It was passed by a Legislature composed of some of the soundest men in the State, and it was approved by De Witt Clinton, then Governor of this State.

Such is the history of the law on this subject, and such are some of the authorities in favor of its propriety and constitutionality. It is proper to add that there has been but one uniform and uninterrupted practice under it, from the time of its first passage in 1793, a period of forty-six years, during which all our Senators in Congress have been chosen under its provisions, without a doubt ever having been intimated until now of its full and literal compliance with the Constitution.

Your committee acknowledge themselves to be of that class who regard a contemporaneous, or nearly contemporaneous, exposition of a constitutional provision, by the practice of those who were familiar with the reasons for its adoption, continued uninterruptedly for nearly half a century by our most distinguished jurists and statesmen of all parties and at all times, as entirely conclusive of the true construction to be given it.

If this rule be not sustained there will be no end to dispute; no man will know what his rights and duties are; for each generation will conceive itself wiser than its predecessors, and constitutions, instead of being barriers to the lust of power and a shield to the people, will become the sport of alternate partisan triumphs.

A power claimed by the States and the very last they would surrender, that of authorizing the emission of bills of credit, by chartered institutions, rests at this moment more upon the uniform practice under the Constitution than upon any provision it contains, and upon the practice in the opinion of many enlightened men, contrary to the plain words of that instrument. We utterly deny therefore that any citizen is at liberty to construe the laws or the Constitution of our country as he may choose to understand them. He is bound by them as they are interpreted by the judicial and other appropriate tribunals of the land; and if that interpretation has assumed the form of a statute, it is the solemn duty of every good citizen to obey it, at least until its unconstitutionality has been declared by the judiciary. If any other principle should be recognized in the administration of our laws, the libeller who chose to understand that part of the Constitution which secures the liberty of the press, as authorizing its abuse to licentious purposes; and the felon whose heart and intellect are so depraved as to claim an equal participation in his neighbor's property, under the plea that it was an unalienable birth-right, and indeed all offenders of every hue and description, must be exonerated from punishment, and society itself must come to an end.

For ourselves, therefore, we are quite content to leave the constitutionality of the law in question, upon the uniform and invariable interpretation it has received not only in our own State, but by the Senate of the United States also; where from the foundation of the government, Senators elected by joint ballot of the two Houses of their State Legislatures, have taken their seats without question and held them without dispute. But where it is so easy to point to the very letter of the authority, it ought not to be omitted.

The clause of the Constitution of the United States has already been quoted, which provides that "the times, places and *manner* of electing Senators shall be prescribed by the Legislatures thereof." The manner of their election is therefore within the control of the electing body. The Senators of each State "are to be chosen by the Legislature thereof." The ordinary course of legislative action is by each chamber passing separately and independently on every proposition. But this is by no means the only course. The practice of the Legislatures of several States to assemble the two Houses in joint meeting, particularly to make appointments to office, which is continued in some of them to this day, was familiar to those who framed the Constitution; and it was well known that the mode of proceeding in legislative appointments va-

ried in the different States. When, therefore, the Constitution gave to the State Legislatures the power of regulating the manner of choosing a Senator, it obviously intended to leave to each the right of pursuing its own practice or adopting any other. It is believed to be an error at the foundation of the doubts now expressed, to suppose that legislative action must necessarily be had in separate chambers acting independently. In ancient times, the Lords and Commons of England assembled together and passed laws. It always was and must be competent to a Legislature, as to any other body or tribunal vested with power, to prescribe its own mode of performing its duties, where no constitutional provision interferes. Our State Constitution provides for the passing of *bills* by separate Houses, but contains no inhibition either directly or by implication against any other mode of performing any other legislative duty.

With the unqualified affirmative power given by the Constitution of the United States, and in the absence of any restriction by any other competent authority; to doubt the power of a Legislature to provide for the election of a Senator, by a ballot of the whole Legislature, of all the members composing it, would seem to be a refinement of constitutional scruples without a parallel; a refinement, not to advance the great end and purpose of vesting the power so as to secure a representation in all contingencies, but to defeat that purpose, obstruct the operation of our system of government, baffle the public will and abandon our position as a sovereign State, in the council of the States. An omission to elect Senators to Congress, by a majority of the States would prevent a quorum of that body from assembling, and would virtually dissolve the Union.

Such a result should not be left to any chance, and much less should its occurrence be facilitated by refined construction, that in itself excites all the elements of hostility, without providing the means of allaying it.

It has seemed to your committee, that every dictate of patriotism, all regard to the memory and practice of the founders of our republican government, every desire to prevent disorganization and confusion, and preserve the institutions of our country in their beautiful symmetry, would induce all reflecting men to discard doubts of such a character, and which, like others recorded in our history, may be followed in future times of violent political excitement, when some expiring party that may hereafter exist, being driven from power by an indignant people, may seek by such miserable pretexts to prolong a feeble existence, or

to gratify an insatiable revenge at the expense of patriotism, and the most solemn obligations of an oath.

If there be no doubt of the constitutionality of the law in question, then there can be none of its binding force upon all whose conduct it regulates; so long as it remains a law, it must be obeyed, even by law-makers. They have no exemption in our land, from the common duty of all citizens, **TO OBEY THE LAW AS IT IS**. Their only remedy, if they dislike it, is to repeal it. No such proposition is made, and the 23d Section, of Title 6, of Chap. 6, of the First Part of the Revised Statutes, is at this moment in as full force as it was on the day it passed. It provides the mode of electing a Senator whenever one is to be chosen.

By passing the resolution referred to your committee, this House will disobey that law, and openly and palpably violate its provisions. It prescribes that the Legislature *shall* elect a Senator in a different mode than by concurrent resolutions. Your committee have come to the following conclusions:

1st. That the Legislature possesses the power of regulating the manner in which a Senator to Congress is to be chosen; and that there is nothing in the Constitution or in the nature of the duty, to require that the manner shall be, by each house acting separately, but that it may be in any manner which the Legislature may prescribe.

2d. That such a law being now in force, regulating the manner, which is not in the least affected by the circumstance that the prescribed time for its performance has elapsed, no other mode can be pursued by the Legislature, until the statute referred to, is repealed.

Your committee, therefore, recommend to the House the adoption of the following resolution:

Resolved, That the resolution of the Senate, proposing, "if the Assembly concur, that Samuel Beardsley be, and he is hereby chosen a Senator to represent this State in the Congress of the United States, in the place of Nathaniel P. Tallmadge, whose term of service will expire on the third day of March next," be returned to the Honorable the Senate, with a respectful message, that so long as the 23d section of the 4th Article and 6th Title of Chapter 6, of Part 1st, of the Revised Statutes remains in force, the Assembly cannot proceed to choose a Senator to Congress in any other manner than that provided by said section; and that it does not deem itself legally competent to act in any way upon the proposed concurrent resolution of the Honorable the Se-

nate, above recited. That although the day assigned by that law for the appointment of a Senator in Congress, has passed, no doubt is entertained on the part of the Assembly, that it is competent to the Legislature to make a valid election in pursuance of its provisions. That the Assembly having already made a nomination, will meet the Senate on any day to compare its nomination with the nomination of the Senate, and in case of disagreement, proceed to the election by ballot of all the members of both Houses; but that if it is believed by the Senate that such an election would be invalid by reason of the day assigned in the law having passed, the Assembly has discharged its responsibility in regard to that contingency, by having passed and sent to the Senate for concurrence, a bill providing for an election on a future day, in the only manner ever known and hitherto used in this State.

No. 273.

IN ASSEMBLY,

March 4, 1839.

REPORT

Of the committee on agriculture.

Mr. C. E. Clarke, from the committee to which was referred the various petitions praying for legislative aid in behalf of agriculture,

REPORTS:

That the committee have had that subject under their consideration, and have given it the attention which its importance seems to demand.

These petitioners are of four kinds. One class asks aid in behalf of the culture of the mulberry and the growth and manufacture of silk; another, for encouragement of the culture of the sugar beet and the manufacture of sugar; another, in behalf of the American Institute; the fourth, and by far the most numerous class, asks aid and encouragement in behalf of agriculture generally, and their views cannot be more fully and laconically expressed than in the words of the petitioners themselves.

“ The memorialists respectfully represent, that agriculture, being the great business of the State, and the source alike of its prosperity, independence and moral health, is peculiarly entitled to the fostering care and patronage of the representatives of the people; that your memorialists consider our general practices in husbandry as defective, and far behind the improvements of the age, tending to exhaust the natural fertility of our soil; and calculated, when our new lands shall be reduced to the condition of most of our old ones, to render us dependant upon

foreign countries for bread-stuffs and other necessities of life—a condition humiliating and degrading to an agricultural people, and yet one that we are already partially realizing;—that while the products of our soil have failed to increase with the increase of our population, the agriculture of some other countries, and of some of our sister states, has been essentially improving, under the wise and salutary provisions of their public councils; and that the like provisions, on our part to stimulate and reward skill and industry, and to diffuse useful knowledge, in a business that so intimately concerns the welfare of all, is loudly called for, by considerations of the public good, as well as of justice to the great agricultural class of the community.

“A bill was reported at the last session of the Legislature to encourage agriculture, which the hurry of business prevented being definitively acted upon. That bill contemplated an appropriation of public moneys in aid of county agricultural societies, and for the establishment of a Board of Agriculture, to collect and disseminate all that might be found useful in the productions and in the management of our husbandry. It also contained provisions to encourage the culture of silk in our State, to arrest the depredations of the grain-worm, and for a general diffusion of useful agricultural information.

“Your memorialists think favorably of the general features of that bill, and consider its provisions eminently calculated to improve our system of husbandry, and to multiply the sources of our wealth and prosperity, by enlightening, stimulating and rewarding useful labor. Your memorialists, would therefore respectfully pray, that the general principles of the said bill, or one of like import, may receive your early attention, and that they may be matured into a law of the State.”

Of these various petitions there are now in the hands of the committee rising of eighty, and the signatures amount to nearly six thousand. It is also understood that in the hands of the Senatorial committee on agriculture there are many more. There are few counties in the State from which petitions have not come, and there is not a single remonstrance.

When it is taken into consideration that this most useful and unpretending class of men are the last to complain, and the last to ask legislative aid, the committee are strongly impressed with the belief that such aid is needed, and that the prayer of the petitioners ought in some form to be granted.

About eight-tenths of the whole population of this State is agricultural; and when it is admitted that a thorough knowledge of agriculture in all its branches requires the possession of as great talents, as much and by far more varied learning than most of the learned professions and mechanic arts, it seems amazing that there should be no school, no seminary, no subdivision of any school, in which the science of agriculture is taught.

We have schools, professors and teachers of divinity, physic and law—for painting, music and dancing—all sciences, from the most holy to the most profane—from the most sublime to the most ridiculous—in the arts of war and the arts of peace—but in the science of agriculture, a business which occupies eight-tenths of all our population, and which is the basis of all our arts and the foundation of our whole system of civilization, we have no professor, no teacher, no school. We have tradition, and tradition alone.

Hence it is, that while all other sciences have advanced towards perfection, and some with a rapidity bordering on the miraculous, the science of agriculture has remained stationary, and the scholar who will take the pains to review the studies of his youth, will find in the *Georgics* of Virgil that the science of agriculture was as far advanced when the Roman bard sang as now.

It was then as now believed that the necessary tendency of seeds and plants and animals was to degenerate, and that the soil as it was wrought must of necessity grow poor and barren, and they looked back with melancholy pleasure to the golden and pastoral ages which were past, and mourned that the age of iron was upon them. To inspire a more cheering belief, to produce an entirely different and more flattering result, should be the object of those who make laws.

It is thought that legislative enactments stimulating industry, directing it correctly, and suggesting new objects for its action, would produce this beneficial result.

It cannot have escaped observation that our soil is not as fertile and productive as it once was, that the quantity of most of our staples has diminished and their quality deteriorated, and of course that the farmer, who year after year finds the productions of his farm diminishing, although his number of acres may remain the same, is actually wasting his patrimony, and contrary to all rules of economy is living, not on his income, but on his capital.

It is therefore supposed that agricultural pursuits cannot be as profitable as other employments, and hence the great strife seems to be, not to render the business itself honorable and profitable, but to escape from it to some more fashionable pursuit, or to abandon farms which are supposed to be worn out, and go in pursuit of new lands, and not profiting by the experience of the past go through with the same system of deterioration again.

Hence the overweening desire to become professional men, to become merchants, speculators. Hence the continued rush of our inhabitants to the west, to the west as though, not merely the fortunate isles, but the fortunate portion of the continent too, lay at the west.

This western fever should, if possible, be cured; this mania for emigration should be checked as exhausting to the State abandoned, and too often disastrous to the emigrants themselves. The State loses its native population and its wealth; the emigrant his home, his friends, his school-house, the library, the church and the innumerable things which improve human nature and sweeten life.

It is true that in some parts of this State our fruit has become diseased, and the trees themselves go to premature decay; that the peach and the melon once so abundant are becoming strangers, and our great staple—wheat—is an uncertain crop, and its culture abandoned where it once abounded. Even the bee, that admired insect, which administers so much to our comfort, while it sets so bright an example of industry, neatness, art and good government, has become a prey to some curse of this iron age. New and unheard of diseases have afflicted our cattle, and the labor of years has been swept away by some nameless and fatal disease. Discouraging as these facts at first appear, the difficulties are not insuperable, they furnish a strong incentive to that ingenuity and talent for useful invention which our countrymen possess in so eminent a degree. To mitigate certainly, and perhaps to subdue, most of these evils, is within the scope of man's power. Does any one despair of renovating and fertilizing a worn-out soil, we could point him not merely to farms but to whole counties in this State, where under an improved system of husbandry the products have been more than doubled; we would direct his attention to Belgium, once the most barren now the most productive soil in Europe. Does any one despair of arresting the progress of disease amongst his cattle, he should remember that a scourge, more deadly than the plague, has been disarmed of its power. And the committee believe that science has in store a remedy

for the insects which destroy our crops as certain and probably as simple as that which ejects the moth from our wardrobes.

It is not for the countrymen of Franklin and Fulton to despair; it is peculiarly for them to meet, encounter and subdue as well the smaller as the greater ills of life.

The farmer of the State of New-York would think he was abused if he were told that his house was neither handsome or cheap; that from the defects in its structure, it was too often the abode of vermin, and the workshop where disease was generated.

He would be still more scandalized if he were told that the health of his wife was often impaired, and perhaps her life shortened, by the inconvenience of his dwelling.

He would hardly give credence if he were told, that by a judicious choice of situation, and proper structure of his barns and yards, and sheds, at least one quarter of the forage fed to his cattle during the winter, might be saved, and the condition of his stock improved, and the tending of his cattle at all seasons and in all weathers, be rendered a neat and pleasant task.

He would be still more incredulous if he were told that the profits of all his stock might be increased at least a quarter by a judicious selection of improved breeds.

If he were informed that an old worn out field could be easily and profitably fertilized, and that by a judicious rotation of crops it might be continually tilled, and not exhausted or impoverished; he would probably express his total disbelief of the fact.

If you called him a pirate, and told him that he robbed and killed without mercy or motive; that the object of his piracy was his servant, a most ingenious and industrious mechanic, who toiled without pay, and clothed and boarded himself, he would probably call you a slanderer, and threaten to hand you over to the buffetings of his lawyer; his wrath might, however, subside, when you explained to him that the faithful servant, whom he robbed and killed, was the bee, and that by a slight tax, or "*judicious* tariff" on his industry, he would get more honey and perpetrate no crime.

Should you inform him that on his own good farm existed the elements of the silk, the sugar, and perhaps the grape; that there was scarce a waste spot on it but that something useful might be induced to grow;

that it was his duty to propagate the walnut, the chesnut, the locust and the cedar; that the former would supply him with nuts and the latter with imperishable timber, and while growing give shade to his cattle and ornament to his farm. He might call you a visionary projector, or plead his reluctance to do any thing for posterity—posterity having done nothing for him.

Should you inform him that the growth and manufacture of silk presented a new branch of industry, peculiarly adapted to females and children, by which his daughters would enjoy better health, become far more useful in society—a profit rather than a burthen to their parents—he might express his incredulity, but at the same time his hopes that such was the fact. For he might recollect the time when his mother carded, spun and wove, in the good old fashioned days of honest industry—when dandies and dyspepsia, and the western fever were unknown, and when to do something useful, had not yet become either unfashionable or degrading.

The committee are of opinion that this criticism is in the main just, and that by the judicious application of science to agriculture, that all, nay, more than is professed, may be performed.

The committee are deeply impressed with the belief, that by legislative aid, such an improved system of agriculture may be introduced as will render the business both honorable and profitable, and that for many years, the State of New-York might retain her whole native population.

That the population, becoming more dense, the farms smaller and better cultivated, and of course more productive, the roads improved, the school-house and the church, and the library, more convenient, the manners and morals of the whole people would be improved, and their character elevated, and this State at no very distant period become an empire in fact, as it is in name, the happy and honored abode of ten millions of freemen.

The committee look forward to the time when the farm-house shall be the neat and cheerful abode of contentment, industry, wealth and refinement, and the business of agriculture become as honored as it is useful; to check that exhausting mode of cultivation which impoverishes as it advances; to stop the great tide of emigration which, with a current so strong and deep, sets to the west; to mitigate the evils and enhance the pleasures, the profits and the honors of agricultural life; to

refine and elevate the character of eight-tenths of the population in this great State, is a work of which any age might justly be proud. And that Legislature which shall be instrumental in effecting it, may repose securely on the enduring gratitude of a whole people.

Confident of effecting much, and hoping to accomplish all these anticipations, the committee have prepared a bill, which they ask leave to introduce.

No. 274.

IN ASSEMBLY,

March 4, 1839.

REPORT

Of the majority of the committee on rail-roads, on the petition of the Mohawk and Hudson Rail-Road Company for State aid.

Mr. Scoles, from a majority of the committee on rail-roads, to which was referred the petition of the Mohawk and Hudson Rail-Road Company, praying for State aid,

REPORTS:

That the said company completed their road so as to be able to commence the transportation of passengers in the month of August, 1831, and have ever since continued the prosecution of business on said road.

That they constructed their road with an inclined plane at each end, to enable them to ascend from, and descend into, the valleys of the Hudson and the Mohawk. It was considered necessary at that time, in consequence of the great elevation to be overcome at each end of the road; but the petitioners believe that in the present improved manner of using locomotive steam power, they will be enabled to dispense with the inclined plane at the western end of the road, by constructing a new section of road of about three miles in length, with an average grade of 35 feet to the mile. They have also a branch rail-road, which is used by horse power, and is very expensive. The petitioners further state that they were obliged to contract a debt of one hundred thousand dollars, which is secured by a mortgage on the road.

For reasons set forth in the petition, the company ask the aid of the State to enable them to alter and improve their road so as to dispense with the inclined plane at the western termination, and the use of horse power, and to discharge the aforesaid mortgage. They have also referred the committee to a report made by Rufus H. King, Joel Rathbone, and John V. L. Pruyn, Esqs. as a committee of directors, to the stockholders of the company, an extract from which your committee have annexed to the report, and which presents a full statement of the business, expenses, and nett gains of the road for several years, and a calculation of the increased profits which may be fairly anticipated from the contemplated alterations.

Your committee can entertain no doubt whatever of the sufficiency of the security of a mortgage upon this road for the whole amount of the loan desired by the company, and even without requiring as a condition precedent, the discharge of the present incumbrance of one hundred thousand dollars. But with a desire to adhere to that moderate and prudent rule of action which it has been the aim of your committee to keep steadily in view, and to avoid any extension of State aid which might elicit the accusation of a want of economy, or might be regarded as presenting an objectionable precedent, they have come to the conclusion not to make the amount of the loan greater than two hundred thousand dollars, and to require that before any portion of the same is received by the said company, the State shall be placed in the position of a first mortgagee.

The committee would further observe, that they are satisfied of the propriety of the proposed alterations, obviating as they do the objection so frequently made to the inclined plane; enabling the company to form a more perfect union with the Utica and Schenectady rail-road; and lessening the time required to pass over the road. It also appears that the saving of expenditure in the operations of the road will be more than sufficient to pay the interest on the cost of the improvement, although the cost should be somewhat more than the estimate contained in the report of the committee of directors.

Considering, therefore, that enabling the company to carry out their proposed alterations of the road would be a public benefit, the committee have prepared a bill which they now ask leave to present.

Extract from Report to the Stockholders.

STATEMENT, showing the amount of business, expenses and net gains of the Mohawk and Hudson Rail-Road, for the years 1833, '34, '35, '36 and '37.

Year.	First class passengers.	Rate.	Receipts for first class passengers.	Tons merchandise.	Total receipts.	Expenses.	Net gains.
1833	115,754	59 ² / ₁₀ cts.	\$69,300 38	2,966	\$77,056 75	\$41,931 17	\$35,125 58
1834	135,365	49 ⁷ / ₁₀	66,431 97	18,689	86,806 15	50,680 50	36,125 65
1835	164,165	50	82,082 80	30,285	114,992 14	65,426 65	49,565 49
1836	152,729	66 ³ / ₁₀	101,309 44	31,444	137,082 01	88,717 95	48,364 06
1837	130,197	73 ¹⁰ / ₁₀	95,275 66	14,960	119,523 08	83,099 05	36,424 03

It will be seen from this table that the business of the year 1835 was larger than that of any other year, and its nett gains were also the greatest. If the same amount of business had been done on the road during the past year, with the present fare of seventy-five cents, it would have amounted in the gross to \$156,033.09, and deducting the expenses, \$83,099.05, as above stated, have left \$72,934.04 as nett gains; being about seven per cent on the capital expended.

The superintendent remarks on the results shown by the above table.

"The apparent falling off of the business of 1836, and the increased expenses of that year, may be explained as follows: The falling off in amount of business was mostly occasioned by a diversion of a part of the travel between Albany and Saratoga Springs, via. Troy, and from thence by rail-road to Ballston Spa. That road was put in full operation at the opening of the season of 1836, and what is called the spring's travel has since been almost equally divided between the two routes. The amount of business thus diverted is estimated to be about equal to the growth of the western travel that year.

"The increased expenditure for 1836 was caused by appropriating a much larger sum for renewing the decayed wooden road, than had been required previously for that object, and by the high price paid for labor and materials.

"It is deemed unnecessary to assign other reasons for the diminished business of the last season, than those which have affected the general business and prosperity of the whole country, upon which the road is dependant for its business, and it may not be inapplicable to say, that it feels the effects of the adversity and prosperity of that country with the precision that the thermometer indicates the changes of temperature."

The great proportion which the expenses of the company bear to its receipts, may be accounted for mainly by two reasons: first, and principally, the shortness of the road—it would cost very little more to operate the road, if twice or three times its present length, than it does now, while the receipts would be increased in proportion to its additional length. Secondly, the great expense of power necessary, in consequence of the elevations to be overcome at both ends of the road—horse, stationary and locomotive power being all required to do the company's business. The expenses of horse and stationary power are two of the heaviest items in the annual expenditures. The following is a statement of the several motive powers for the year 1837:

<i>Horse power:</i> for transportation of property from depots to planes, and from head of east plane to junction,.....	\$881 04
The same for branch road, including drivers' wages,	7,048 36
The same from junction to head of western inclined plane, and at head of plane west end,	3,818 79
The same from foot of plane to Schenectady termination, including baggage horse,.....	2,934 96
Total cost of horse power,.....	<u>\$14,683 15</u>

The sum of \$881.05 was expended in addition, for horse power used in maintenance of way which would be necessary under any circumstances to some extent.

Stationary power: engine and plane, east end,

fuel, wages of men, &c. \$4,879 95

Same west end, 7,912 30

Total cost of stationary power, \$12,792 25

Locomotive steam power: fuel, wages, repairs of engines, &c. \$17,022 21

If locomotive steam power could be used from depot to depot, nearly the whole expense of stationary and horse power would be saved, as it would require but comparatively little addition to the locomotive power to do the whole business. Another great advantage attending the use of locomotive power is, that its expenses do not increase in proportion to the increase of business in the same ratio that horse power does. It is probable that four engines, the number now owned by this company, or at most, five, would be able to do all the business from depot to depot, if there were no inclined plane to be overcome, that would present itself during the next ten years, although it should be twice that of the year 1837; whereas that increase of business would require an actual increase of horse power in the same ratio, and a consequent increase of expense.

It will be seen by the following statement, extracted from the superintendent's report, that the cost of operating the branch road leading into Albany, on which horse power is used altogether, and the cost of maintaining the stationary power at the two planes, and the horse power from the foot of the planes to the depots, about four miles in all, exceeds that of operating the main road between the two planes—about 14 miles.

“ For horse power between the depot at Albany and junction,	\$7,048 36
For horse power between the foot of east inclined plane, and freight depot,	881 04
For engine and plane, east end,	4,879 95
	<u>\$12,809 35</u>
For engine and plane, west end,	\$7,912 30
For horse power between the foot of western inclined plane and the depot at Schenectady,	2,934 96
	<u>\$10,847 26</u>

Expense incident to 4 miles, \$23,656 61

For locomotive steam power between the two inclined planes, \$17,022 21

For horse power between the two inclined planes, 3,524 18

Expense incident to 14 miles is, \$20,546 39

And the excess of cost of 4 miles over that of 14 is, \$3,110 22

The superintendent adds, "it will readily be seen that if the road could now be so altered, as to admit of the employment of locomotive steam power from depot to depot, the expense of that power would not be materially increased by running over the additional distance, and the maintenance of an expensive horse power could be altogether dispensed with. But nature interposes an insuperable barrier to the accomplishment of this at the eastern termination, and to have it so located as to preserve an easy communication with the Hudson river; the elevation to be overcome (222 feet in $2\frac{1}{2}$ miles,) is greater than is practicable to employ the locomotive engine to operate on advantageously."

A new branch road leading into the city of Albany, terminating at some point nearly on a range with the Capitol, might be constructed, on which locomotive steam power could be used. Several routes have been surveyed for this purpose, but it is considered impracticable to use steam power with any advantage, to a point lower than the range spoken of, which is about 200 yards west of the range of the present termination in State-street. There is no doubt that such a road could be constructed, which would not exceed about one and a half miles in length, the interest on the cost of which would be more than saved by the reduction of expenditure in operating the road; and the company will, it is believed, find it both necessary and expedient before long to apply for authority to construct it, or make some arrangement to do its business to better advantage than on the present branch road. But the situation of its affairs renders it perhaps inexpedient at the present time, to take any measures to effect this object immediately, however much it might eventually benefit the stockholders, unless some fair prospect existed of procuring funds for the work, without resorting to the income of the company for that purpose.

An alteration of the road at the western end, avoiding the present inclined plane, and abandoning its use, would be of great advantage to the company, not only by saving a large expenditure in maintaining the stationary power at the plane, and the horse power between its foot and the depot in Schenectady, but by lessening the time required to pass over the road, and by enabling this company to form a more perfect union with the Utica and Schenectady rail-road, so that engines could run from one road to the other, which it is believed would eventually lead to a consolidation of the work shops of the two companies, instead of their maintaining separate establishments as at present, and to the formation of a joint stock of coaches, to run over both roads. It would also obviate the objection made by many to this route, on account of the inclined plane—one unfounded, it is true, as the plane is as safe, if not safer, than any other part of the road; but which, nevertheless, is made use of to the prejudice of the company. It is intended to make application to the Legislature at its present session, for authority to construct this new section of road. It will strike the present line of road about three miles from Schenectady, and its grade is not to exceed thirty-five feet to the mile. It is confidently hoped, that if authority is obtained to construct this road, arrangements which are now in view will be completed, by which the amount necessary for its construction will be loaned to the company, to be repaid by annual instalments, which will not probably exceed much, if any, the annual saving that will be effect-

ed in its expenditures by the contemplated change. Unless such arrangement to obtain the funds which would probably be needed for the purpose, can be effected, the board would not feel at liberty, even if authorized by law, to incur the expenditure necessary to effect the object, unless with the assent and advice of the stockholders.

As before remarked, and it is a consideration, which, in determining upon the expediency of the proposed change of terminations and the use of locomotive steam power, from depot to depot, should not be forgotten; the benefit would not consist merely in a reduction of the present amount of expenditure for horse and stationary power, but in saving the expenditure that will become necessary for additional horse power with the future increase of the company's business—as that power must be increased in the same ratio with the business to be done—while the cost of additional locomotive power will be comparatively inconsiderable.

The following extracts on the subject of the proposed alterations at the two ends of the road, are taken from the superintendent's report.

“For the purpose of illustrating what the whole benefits may be, by altering those sections of road that promise to affect the business most favorably, we will recapitulate the expenses of the last year, and contrast them with the estimated expenses of doing the same amount of business, when the contemplated alterations are made.

Expenses of 1837 were—

Albany branch termination,	\$3,150 66
Horse power,	15,564 20
Schenectady termination,	2,932 38
Maintenance of way,	7,735 78
Engine and plane, W. end,	7,912 30
Engine and plane, E. end,	4,879 95
Locomotive steam power—3 engines,	17,022 21
Miscellaneous account,	5,477 33
Damages,	772 55
Wagon repairs,	2,330 81
Agent's office,	4,753 77
Carriage repairs,	3,392 67
Transportation of property,	7,174 44

\$83,099 05

Estimated expenses by proposed new branch road, and another line of road as a substitute for the west inclined plane.

Albany branch termination	\$3,150 66
Schenectady termination	2,932 38
Maintenance of way	7,735 78
Engine and plane, east end	4,879 95
Locomotive steam power—4 engines	22,696 28
Miscellaneous account	5,477 33
Damages	772 55
Wagon repairs	2,330 81

Carried forward..... \$

Brought forward,.....	\$	
Agent's office.....	4,753	77
Carriage repairs	3,392	67
Transportation of property	7,174	44
Horse power from foot of east inclined plane,	658	49
Horse power from junction to head of east		
plane	1,000	00
Interest at 7 per cent on \$45,000, cost of new		
branch	3,150	00
Do. do. on \$93,546 50 do. west end.....	6,548	28
		<u>\$76,653 39</u>

Difference in favor of alterations per annum..... \$6,445 66

“And a difference in time employed by the two modes of doing business (supposing a new branch road to be made) as follows:

From Albany to Schenectady, by present mode, is (estimating for the heaviest trains that pass over the road:)

From depot to junction by horses	25 minutes.
From junction to H. W. I. plane, 12 to 15 miles per	
hour	48 “
From head of W. I. plane to depot (two operations on	
plane, each 5 min.)	10 min.
For detentions at head and foot of plane.....	5 “
From foot of plane to depot	5 “ 20 “

Time by present mode from Albany..... 93 minutes.

From depot to depot by proposed mode.

From depot at Albany to contemplated junction, $1\frac{4\frac{4}{10}}{10}$	
miles, by engine speed 7.98 miles per hour..	10 min.
From junction to depot to Schenectady, 14 miles,	
at 15 per hour.....	56 “ 66 minutes.

Difference in favor of proposed mode up, is..... 27 minutes.

For the same down, viz:

From depot at Schenectady to foot of plane.....	5 minutes.
Two operations on plane, 5 minutes each.....	10 “
Detentions at head and foot of plane.....	5 “
From head of plane to junction 12 miles, speed 15 miles	
per hour	48 “
Junction to depot	20 “

Time down by present mode..... 88 minutes.

For the same by new mode, by an extra engine to help the inclination of new line of road $15\frac{1}{2}$ miles, speed 15 miles per hour

62 “

Difference in favor of proposed mode down..... 26 minutes.

"It is proper to remark, that all the benefits that may result from the proposed alterations, do not appear from the comparative expense incident to the two modes as estimated above, as they are both based on the present quantity of business; whereas the estimate for the cost of the locomotive steam power is sufficiently large for the business, when it may have increased one-third in quantity; and on all those sections of road where horse power is employed, any increase of business would require a corresponding increase of that power.

"By the statement showing the whole business of the road since the 1st January, 1833, it will appear that the business of the first three years increased in quantity at the rate of more than 14 per cent annually; and what has been said on the subject of the same ratio of increase not continuing for the two succeeding years, does not warrant the belief that it will not increase hereafter with the general growth and trade of the western country; which will probably continue to be as rapid as heretofore.

"It is believed that if this line and grade of road was so altered as to enable the company to employ locomotive steam power, from depot to depot, that no other line of communication between these two points could offer equal facilities for the business."

It will be seen that in the above estimate, interest is charged upon the supposed cost of the new sections of road to be constructed. For the other benefits expected to result from the alterations referred to, no estimate has been or can well be made at this time.

It has been suggested that a continuation of the present main line of the company's road, from its termination near the south bounds of Albany, to a point nearer the business portion of the city, would supersede the necessity of a branch road terminating on the elevated ground in the western part of the town, as the transportation of passengers as well as freight, might be conducted over this road and the eastern inclined plane, and so on upon the main road to Schenectady. The fact that passengers would still by this route be required to pass over an inclined plane, and one considerably longer than that now existing at the western end, might be made use of as it now is, to the prejudice of the company's business. The comparative merits, however, of this plan and that of a new branch road have not yet been so fully inquired into as will be requisite if an alteration is finally determined on.

The committee have thus given to the stockholders a statement which they have endeavored to free from burdensome details, and still present all the material facts and considerations connected with the affairs of the company. Although the circumstances under which the road of the company was originally constructed, made its cost far exceed the amount anticipated at its commencement; still the errors committed, if they were such, were chargeable to the period of its construction, and the want of experience on the subject at the time. "When it was located, it was supposed to be almost impracticable to operate a railroad at a high speed unless it was straight and level; consequently the first requisite was strictly adhered to, with the exception of slight curves near each termination, and its grade between the two inclined planes where stationary power is used, may be said to be better than

level for the mixed business it does, as its inclination is in the direction of the preponderating weight to be moved."

It is to be regretted that as yet the stockholders have not received that return for their investment which the public spirit and enterprise manifested in the construction of the road, merited. The time is coming, however, when, unless all expectations as to the growing enterprise and business of this country are disappointed, the income of the road will, it is believed, pay a reasonable interest upon its cost.

RUFUS H. KING,
JOEL RATHBONE,
JOHN V. L. PRUYN,
Committee of Directors.

Albany, March 8, 1838.

No. 275.

IN ASSEMBLY,

February 27, 1839.

COMMUNICATION

From the Governor, relative to the Geological
Survey of the State.

Albany, February 23, 1839.

TO THE ASSEMBLY.

By an act of the Legislature, passed on the 15th of April, 1836, the Governor was authorized and directed to employ a suitable number of competent persons, whose duty it should be under his direction to make an accurate and complete geological survey of this State; which survey should be accompanied with proper maps and diagrams, and furnish a full and scientific description of the rocks, soils and minerals of the State, and of its botanical and zoological productions, together with specimens of the same. It was further provided, that such maps, diagrams and specimens should be deposited in the State library, and that similar specimens should be deposited in such of the literary institutions of the State as the Secretary of State should direct.

The act appropriated \$26,000 annually, during four years, to defray the expenses to be incurred, and directed that the person or persons who should be employed should annually make a report to the Legislature before the 1st day of February, setting forth generally their progress in the survey.

I have received a communication from my predecessor, in which he informs me that on the first of January last the following persons were employed in the several departments, and for the compensation respectively mentioned, viz:

John Torrey, in Botany, salary,	\$1,200	
Allowed for drawings,	300	
	<hr/>	\$1,500
Lewis C. Beck, M. D. in Mineralogy, salary,	\$1,200	
Allowed for drawings,	300	
Allowed for assistance and some expenses,	150	
	<hr/>	1,650
James E. De Kay, in Zoology, salary,	\$1,500	
Allowed for drawings,	300	
	<hr/>	1,800
John W. Hill, in Zoology, employed as draughtsman,		800
Timothy A. Conrad, in Palæontology, salary,	\$1,500	
Allowed for drawings,	300	
	<hr/>	1,800
William W. Mather, (1st district,) in Geology, salary,	\$1,100	
Allowed for drawings,	300	
Allowed for cases for specimens,	175	
	<hr/>	1,575
E. Emmons, (2d district,) in Geology, salary,	\$1,500	
Allowed for drawings,	300	
	<hr/>	1,800
Lardner Vanuxem, (3d district,) in Geology, salary, ..	\$1,500	
Allowed for drawings,	300	
	<hr/>	1,800
James Hall, (4th district,) in Geology, salary,	\$1,500	
Allowed for drawings,	300	
	<hr/>	1,800

I have received reports from Dr. Lewis C. Beck, Timothy A. Conrad, William W. Mather, E. Emmons, Lardner Vanuxem and James Hall. These reports are herewith submitted. I have received no report or communication of any kind from either Mr. John Torrey or Dr. James E. De Kay.

It affords me great pleasure to bear my testimony to the ability and fidelity with which the duties of those persons whose reports are submitted to you have been discharged.

Neither Dr. De Kay nor Mr. Torrey has hitherto made any report. By reference to a communication of the former gentleman submitted to the Legislature in February last, you will perceive that it is supposed that from the nature of the duties of himself and Mr. Torrey, partial reports cannot be made until their labors are brought to a close.

If the responsibilities resting upon them shall be discharged with ability equal to that of their associates, the Geological survey will abundantly repay the munificence of the State by numerous and lasting benefits.

It ought to be known to the Legislature that the collections of specimens will far exceed in number and value the expectations indulged at the time of the passage of the act, and cannot be profitably or conveniently deposited in the State library or in any apartments in the Capitol which can be appropriated for that purpose. The whole collection will form a museum of the highest scientific interest. Unless suitable arrangements are made for its preservation and exhibition, the benefits of the survey will be in a great measure lost.

I submit some suggestions on this subject made by the Geologists residing in this city.

WILLIAM H. SEWARD.

COMMUNICATION

From Messrs. Emmons and Hall, relative to a place of deposite for the different specimens collected by the Geologists.

To His Excellency WM. H. SEWARD,
Governor of the State of New-York.

SIR—

We respectfully represent to your Excellency the urgent necessity of early providing for the proper disposition and arrangement of the specimens collected by the gentlemen engaged in the Geological Survey. That some definite disposal of them be soon made, is due not only to the individuals themselves, but to the people, who should be apprised of the extent and fruit of the enterprise which they have sanctioned.

Two plans have been proposed for this purpose. One is, the erection of a suitable building. We concur in recommending this as most accordant with the generous spirit which sanctioned the survey, although we are at the same time apprehensive that the necessary expense may deter from its adoption. The building in question should not be more than one story high, without windows, but lighted from the top, and of sufficient elevation to admit of a gallery round the upper part. A single room, if sufficiently large, will contain the whole collection; and in the rear of the rotunda, (for the room had best be circular,) might be one or two working rooms, for fitting and preparing the specimens.

As an alternative, it has been proposed to occupy the four corner rooms in the upper story of the new State Hall now building. The

size of these rooms, (as we are informed by the superintendent of the building,) is 22 by 32 feet respectively, with an elevation of 10 feet. They are well lighted. The questions to be disposed of, prior to their occupation, are, whether they will be needed by the State officers; and again, whether the height may not be so great as to prevent the desirable attendance of visitors.

Some idea may be formed of the internal arrangement that is necessary from the following detail.

The Zoological specimens must be placed in glass cases, to preserve them from dust and decay. The smaller beasts and birds may thus be arranged along the walls, but the larger animals, as the moose, bear, wolf, &c. may require to be placed in the centre of one of the rooms, protected by glass on each side. The fishes, and several of the lower classes of animals, will need to be kept in spirits, and an outlay will therefore be required for it and the proper glass vessels. The insects and shells will probably show to most advantage in drawers covered with glass; and the drawers may form the lower part of the cases above suggested.

The Botanical specimens will require a separate case. They will be preserved in bound volumes, lettered according to the arrangement that may be adopted.

The major part of the collection, however, will consist of the Meteorological and Geological specimens, (including fossils.) These should all be arranged in cases covered with glass. And we respectfully suggest that a double suite of specimens be placed in the museum: one in the order which shall be agreed upon as most conformable to the existing state of science, and another geographically arranged; by which we mean, that a separate division be appropriated to each county in the State, and that the minerals, rocks and fossils found in each be placed together, leaving at the same time sufficient space for new discoveries.

The magnitude of this collection will be in some measure appreciated, when we state, that the number of minerals, rocks and fossils in this State will probably exceed 4,000. If it should be determined to preserve any of the soils, of course more room will be required for the specimens of each county.

In the above remarks we only intend to give a general idea of the preparation necessary to fit the rooms in question for the reception of

the museum. The superintendent of the Hall states that they can be finished in August, and should it be determined to select them, the work needed for preparing the cases may be early put in hand.

Very respectfully, sir,

Your most obd't serv'ts,

EBENEZER EMMONS.

JAMES HALL.

Albany, Feb. 23, 1839.

REPORT

Of Dr. Lewis C. Beck, on the Mineralogical and Chemical Department of the Survey

To His Excellency WILLIAM H. SEWARD,
Governor of the State of New-York.

SIR—

In fulfilling the duty which the act authorizing a Geological Survey of the State imposes upon me, I propose not only to report my operations during the past year, but to present a general view of what has been heretofore done in the department committed to my care.

1. The State of New-York is so very rich in minerals, and the examination of their chemical characters is in many instances a matter of so much scientific and practical importance, as to require the most careful and patient attention. These investigations have necessarily occupied so much of my time, that I have thus far visited only some of our more important mineral localities. And so much still remains to be done in the chemical part of my work, that it will not be possible for me within the period prescribed for the completion of the survey, to give a much wider range to my field operations. But by the aid of those gentlemen who are engaged in the minute survey of the different districts, I shall perhaps be enabled to present a sufficiently complete account of our mineral resources.

2. The following is a tabular view of the minerals which have hitherto been found in the State of New-York. In presenting it in this form, I beg leave to observe, that as this is a work which has been authorized by, and intended for, the people of the State, I think it proper to adopt that arrangement which will be most easily understood, and which, on the whole, appears to be best suited for a popular and practical treatise on the minerals and mineral waters of the State. I propose, however, to introduce into the final report all those descriptive

characters which the advanced state of the science to which it is devoted may seem to require. I may also observe, that the annexed table contains the names of those minerals only which have been found by myself, or published as New-York minerals, by others. Several doubtful ones collected during the progress of the survey, still remain to be examined; and when they have been, it is probable that the catalogue will be somewhat enlarged. I need scarcely say that I invite the attention of those who are engaged in similar pursuits to the general outline here presented, and solicit their aid in the completion of the work.*

Tabular View of the Minerals of the State of New-York.

CLASS I.

GASEOUS MINERALS.

Usually held in solution by water under pressure; but given out when the pressure is relieved.

1. Combustible Gases.

Those which burn upon the application of a lighted taper.

Hydrogen gas. Carburetted hydrogen gas. Sulphuretted hydrogen gas.

2. Non-combustible Gases.

Those which do not burn.

Oxygen gas. Nitrogen gas. Carbonic acid gas.

CLASS II.

COMBUSTIBLE MINERALS, NOT GASEOUS.

Solid or liquid bodies which burn with ordinary degrees of heat.

Anthracite.	Coal.	Lignite.	Peat.
Graphite.	Bitumen.	Sulphur.	Amber.

CLASS III.

UNCOMBINED ACIDS, NOT GASEOUS.

Sulphuric acid.

CLASS IV.

ALKALINE MINERALS.

Composed of one or more of the common alkalis, ammonia, potash, or soda, and usually containing an acid.

1. AMMONIA.

Carbonate of ammonia.

* My principal object in publishing this tabular view, at the present time, is, that I may profit by remarks and criticisms upon the proposed arrangement, and be apprized of any omissions in the catalogue of our minerals.

2. POTASH.

Muriate of potash. Hydrobromate of potash. Sulphate of potash.
Carbonate of potash.

3. SODA.

Muriate of soda. Sulphate of soda.
Hydrobromate of soda. Carbonate of soda.

CLASS V.

ALKALINE EARTHY MINERALS.

Composed of one or more of the alkaline earths, baryta, strontia, lime, or magnesia, combined with water or an acid, and frequently containing some metallic oxide.

1. BARYTA.

Sulphate of baryta.

2. STRONTIA.

Sulphate of strontia. Carbonate of strontia. Barystrontianite.

3. LIME.

Muriate of lime. Anhydrite. Arragonite.
Fluor Spar. Gypsum. Calstronbarite.
Nitrate of lime. Phosphate of lime.
Calcareous spar, and most of the varieties of carbonate of lime.

4. MAGNESIA.

Hydrate of magnesia. Sulphate of magnesia. Dolomite.
Muriate of magnesia. Carbonate of magnesia. Hydraulic limestone.
Hydrobromate of magnesia. Rhomb Spar.

CLASS VI.

EARTHY MINERALS.

Composed chiefly of one or more of the earths proper; they frequently contain some alkali, alkaline earth, acid or metallic oxide.

1. SILICA.

a. Minerals in which the silica is nearly pure.

Quartz, (most of its varieties.) Basanite.
Chalcedony. Jasper.

b. Minerals in which the silica generally performs the part of an acid.

Tabular Spar. Talc. Byssolite.
Nemalite. Diopside. Hypersthene.
Serpentine. Pyroxene. Hydrous Anthophyllite.
Kerolite or Magnesite. Hornblende. Warwickite.

Chondrodite.	Tremolite.	Rensselaerite.
Boltonite.	Asbestos.	Terenite.

2. ALUMINA.

a. Minerals in which the alumina is nearly pure, or combined with an acid.

Corundum.	Gibbsite.	?Eupyrchroite.
Spinelle.	Sulphate of Alumina.	
Automalite.	Alum.	

b. Minerals composed principally of silica and alumina.

Idocrase.	Labradorite.	Pyrophyllite.
Garnet, (several varieties.)	Kaolin.	Epidote.
Cyanite.	Spodumene.	Chlorite.
Zoizite.	Zeolite.	Mica.
Seapolite.	Laumonite.	Tourmaline.
Meionite.	Stilbite.	Clintonite.
Prehnite.	Mesotype.	Xanthite.
Staurotide.	Apophyllite.	? Chiltonite.
Feldspar.	Chabazie.	

3. GLUCINA.

Emerald.	Chrysoberyl.
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4. ZIRCONIA.

Zircon.

CLASS VII.

METALLIC MINERALS OR ORES.

Composed either wholly or in part of the metals, commonly so called.

1. IRON.

Native iron.	Iron pyrites.	Carbonate of iron.
Magnetic iron ore.	White iron pyrites.	Sulphate of iron.
Specular iron ore.	Arsenical pyrites.	Chromate of iron.
Limonite, (several varieties.)	Cube ore.	Phosphate of iron. ?
Sulphuret of iron.		

2. MANGANESE.

Earthy oxide of manganese.	Babingtonite.
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3. ZINC.

Blende, or sulphuret of zinc.

4. LEAD.

Galena, or sulphuret of lead.	Molybdate of lead.?
Sulphate of lead.	Vauquelinite.
Carbonate of lead.	

5. BISMUTH.

Native bismuth.

6. COPPER.

Pyritous copper.	Carbonate of copper.
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7. TITANIUM.

Rutile.	Titaniferous iron.
Crichtonite.	Sphene.

8. MOLYBDENUM.

Sulphuret of molybdenum.

9. ARSENIC.

Orpiment, or yellow sulphuret of arsenic.

10. SILVER.

Native silver.	Sulphuret of silver.
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In continuing my remarks upon the Mineralogy of the State, it will be convenient to follow the order here given. I shall, however, confine my attention chiefly to the more useful minerals.

GASEOUS MINERALS.

The nature of these bodies will be sufficiently understood from the definitions given in the table.

3. The first two, viz. *Hydrogen and Carburetted hydrogen*, are found among the gases evolved by many of our springs. Hydrogen gas is seldom abundant in its pure uncombined form, but carburetted hydrogen often contains an excess of hydrogen. Both these gases are characterized by their inflammability, and by their being destitute of the offensive odour of sulphuretted hydrogen gas.

Carburetted hydrogen is evolved by numerous springs in our State, extending from the valley of the Hudson to the shores of Lake Erie. In my last report I gave an account of such gas springs as were known to me at the time it was written; during the past season I have added a few others to the list, and the final report will embrace as complete a view as I can prepare of this interesting subject.

4. *Sulphuretted hydrogen gas*.—This gas is given out by what are commonly called sulphur springs, and which are found in almost every part of the State. The table appended to my report of last year, contains an enumeration of sixty-three of these springs. Twelve or fifteen have been added since, and the number will no doubt be still further increased. There are probably not less than a hundred important sulphur springs in the State. Many of these are still to be analyzed.

5. *Oxygen gas*.—This substance has been thought in some cases to be in excess in the gases given out by mineral waters, but if this be so, its occurrence is exceedingly rare. I have introduced it chiefly for the purpose of directing attention to the subject.

6. *Nitrogen gas*.—This is given out by what are termed nitrogen springs, to which class belong the celebrated Lebanon Spring, one or more in Rensselaer county, and one in Franklin county. Mr. Hall, the Geologist of the Fourth District, informs me that he has ascertained during the last summer that the Canoga spring, in Seneca county, also belongs to this class of springs. Nitrogen gas is here abundantly evolved from a pool twenty feet in diameter.

7. *Carbonic acid gas*.—This is copiously evolved by springs in various parts of the State, and constitutes an important ingredient in those of Ballston, Saratoga and Albany. When the water is highly charged with this gas, it is usually termed acidulous. But it often exists in smaller quantities, and forms what are called petrifying springs, from the fact that by an excess of carbonic acid a larger proportion of carbonate of lime is held in solution, and this carbonate is again deposited, when the water comes into contact with the air.

The notice of these gaseous bodies will therefore bring to view the whole subject of the mineral springs of the State, with the exception of the brine or salt springs, to be subsequently considered. It is my intention to trace on a skeleton map the localities of the most important of these springs, designating each by a particular character, and to prepare a complete table of them, arranged under the counties in which they are situated;—upon the plan of that attached to my last report.

COMBUSTIBLE MINERALS, NOT GASEOUS.

8. *Graphite or plumbago*.—The localities of this mineral are very numerous in our State, but it is rarely found in quantities sufficient for any useful purpose. A mine, however, has been opened in the granite mountains south of Fishkill Landing, in Dutchess county, from which

some tons have been extracted.* There is also an important locality near the village of Alexandria, in Essex county.† This mineral is used in the manufacture of pencils, and for diminishing friction; it also constitutes the basis of the *silver lead*, extensively used as a coating for cast iron.

9. *Bitumen*.—Under this species is to be placed the oily bituminous substance called petroleum, and known with us by the names of Seneca or Genesee oil. There is a celebrated locality in the town of Cuba, in Allegany county.‡ It also occurs in Chautauque, Erie, Seneca and Albany counties, although in comparatively small quantities. It appears to have some connexion with the carburetted hydrogen gas evolved in various parts of the State. Other localities will probably be discovered during the progress of the survey.

10. *Sulphur*. This well known mineral, though for the most part confined to volcanic countries, has nevertheless been found in the State of New-York. It occurs in a pure form in a granitic rock near West-Point,§ and a few miles west of that place it has been found in a quartz rock. Small masses are also occasionally met with in the gypsum beds of Onondaga county, and it is not unfrequently deposited in a nearly pure form by waters charged with sulphuretted hydrogen gas. As the result of the decomposition of iron pyrites it is very abundant, but it is then almost always too impure to be classed under this head.

11. *Amber*. This mineral so constantly accompanies the beds of lignite and iron pyrites which occur in New-Jersey, that it will doubtless be found in the similar deposits on the western side of Staten-Island.

12. *Anthracite and Coal*.—There are many localities of these important minerals in this State, which must be noticed in the general work; but unfortunately, they have not hitherto been found in quantities sufficient for any useful purpose. Although large sums have been expended in researches for these minerals, and high expectations in some instances excited, they occur only in very thin layers, and in geological relations which differ entirely from those of the true coal measures.

* Prof. Mather's Report for 1838.

† See an interesting notice of this locality by George W. Clinton, Esq. in the *Transactions of the Albany Institute*, i. 233.

‡ Mr. Vanuxem's Report for 1837; and Prof. Silliman's Notice of a Fountain of Petroleum in Allegany county, N. Y.—*Silliman's Journal*, xxiii. 97.

§ Major Douglass, in *Cleveland's Mineralogy*.

13. *Lignite*.—This substance, which is merely mineralized or altered wood, is associated with iron pyrites in a bed of astrigent clay near Rossville, in Richmond county. Some of the specimens have the appearance of wood charred by the action of an acid, as, for example, the sulphuric; and it is not improbable that this lignite owes its origin to the action of the excess of acid which this clay contains, upon drift wood from time to time deposited on this shore of the island.

14. *Peat*.—Of this useful, but in the State of New-York, almost entirely neglected combustible, we have already discovered numerous important localities; and many others will undoubtedly be added before the completion of the survey. The time cannot be far distant when the value of this article will be duly appreciated. In many countries it is extensively employed as fuel; and in several manufactures it might be used here with great advantage; as, for example, in the burning of bricks, of limestone, &c. Specimens from the most extensive peat bogs in the State should be analyzed to determine their composition. Some varieties of peat contain substances which render them unfit for culinary purposes.*

UNCOMBINED ACIDS, NOT GASEOUS.

15. *Sulphuric acid*.—This is the only mineral belonging to this class, which has, I believe, been found in New-York. An interesting locality of it occurs in Byron, Genesee county, of which I gave a particular account in my last report. The occurrence of this substance in such quantities is the more worthy of notice, as it is stated by the highest authority on this subject, "that sulphuric acid in a free state is found only in springs connected with volcanoes, to which it is obviously referable."†

ALKALINE MINERALS.

16. *Sulphate of soda*.—This salt, mixed with various proportions of other salts, is found in the form of an efflorescence on the calciferous slate of Mr. Eaton, near Rochester, Monroe county. It is also held in solution by the waters of some of the mineral springs found in the western part of the State.

* For particulars concerning the mode of collecting and preparing peat, I would refer to Dumas, *Chimie appliquée aux Arts*, 1. 587. This article seems to be at present exciting some attention as a manure.

† Dr. Daubeny's Report on Mineral and Thermal Waters.—*Transactions of the British Association for the Advancement of Science*, for 1836.

17. *Carbonate of soda*.—Found, in a nearly pure form, on the walls of several buildings in the cities of Albany and New-York. It is also an ingredient of the mineral waters of Saratoga and Ballston.

18. *Muriate of soda, or common salt*.—This important mineral is found abundantly in solution in the western part of the State, forming what are called salt or brine springs. Of these, I presented a view in my last report. Several others have been added to the list during the past year, and in the final work I intend to present a complete table of them, and to designate the localities of the most important ones on a skeleton map, with the other mineral springs.*

19. *Sulphate of potash, Muriate of potash, Hydrobromate of potash, Hydriodate of Soda*.—These are met with only in solution in mineral or sea waters.

ALKALINE—EARTHY MINERALS.

20. *Sulphate of baryta*.—This mineral, some varieties of which resemble marble, but are easily distinguished from it by their greater specific gravity, occurs in various parts of the State. At Pillar Point in Jefferson county, it may be obtained in large blocks, and is compact,

* During the last session of the Legislature an act was passed authorizing "the Superintendent of the Onondaga Salt Springs to procure a set of standard instruments, and make observations once a week upon the strength of the brine in the different salt wells in use by the State, and state the result of such observations in his annual report to the Legislature." At the request of the superintendent and inspector at Salina, these instruments were constructed under my direction. Two objects were to be attained, viz: 1st, That the instruments, which from their particular use may be called *Salometers*, should be so sensible as to indicate slight differences in the density of the brine; and 2dly, That they should be made of some material less frail than glass, and not liable to be corroded by the brine. After a series of experiments in which I was assisted by Mr. Allen H. Gill, then in my laboratory, to determine the size of the bulb, length of the stem, &c.—they were constructed of silver, with the bulbs nearly two inches in diameter, the stems of flattened silver tube about twelve inches in length, and with a proper weight at the lower extremity. The graduation was accomplished by sinking one of the instruments to a certain depth in brine taken from the Salina well. The density and exact proportion of saline matter in this brine were then accurately ascertained. This gave one point. A known quantity of rain water was now added to this brine, and after allowing time for the mixture to be complete, the instrument was put into this diluted brine. It, of course, sunk lower than before, and having marked this point on the stem, as I did the former, the density of the mixture was ascertained. This gave two known points, and the graduation was then easily completed.

At the request of the officers at Salina, I graduated the instruments according to the centigrade scale, that is, distilled water being 0, and saturated brine 100°. Their range is from 10 to 12 degrees of this scale. The stems being about a foot in length, a difference of one-eighth of a degree, or of less than 4-100ths in the proportion of salt which the brine contains, can be easily detected. An increase in the range of the instruments would have impaired their delicacy, and the principal object for which they were constructed, viz. to determine whether the density of the brine is influenced by the seasons, by the height of the water in the lake, &c. could not have been attained.

variously coloured, and susceptible of polish. It is also found in St. Lawrence, Herkimer, Greene and Schoharie counties. In the latter, it occurs in various forms, and is associated with strontianite and other interesting minerals. The localities in this county I have not yet had an opportunity of visiting.

Sulphate of baryta is of considerable value as a paint. Ordinary white lead often contains a large proportion of this mineral. When it is of a white colour, which is often the case, it is difficult to detect this adulteration, in consequence of the specific gravity of the sulphate of baryta approaching so nearly to that of the white lead. The mixture answers equally well as a paint for most purposes, but it should be sold at a much cheaper rate than the unadulterated article. Both the sulphate of baryta of the northern part of the State and the carbonate of strontia of Schoharie, may become valuable as paints.

21. *Carbonate of lime*.—This important mineral is most abundantly diffused, and exists in vast strata under the name of limestone. There are several subspecies or varieties which are to be studied and described by the mineralogist. Among these may be enumerated:—*Calcareous spar*, of which this State affords some fine localities, as De Long's mill, in St. Lawrence county, and Ox Bow, in Jefferson, where specimens have been found quite equal to the celebrated Iceland spar;—*fibrous limestone*, *agatic mineral*, and *calcareous tufa*; of each of which we have several interesting localities. The most useful and important of these are what are usually comprized under the general name of

MARBLES.

22. The term marble, in strict propriety, should be confined to those varieties of carbonate of lime which are susceptible of a polish; including also some minerals in which the carbonate of lime is mixed or combined with other substances. In a wider sense, however, it may include all those varieties of limestone which are used for building purposes.

It is not my design at present to notice all the localities of marble in this State. The information which has been collected is not sufficiently ample to warrant such an undertaking. Enough, however, is already known to satisfy us that New-York possesses inexhaustible stores of marble, which must form an important item in her mineral resources.

23. The marbles of Sing-Sing and Kingsbridge in Westchester county, have long been used as building materials. Professor Mather will undoubtedly present full details concerning the extent and position of

the quarries from which these are obtained. I shall only add a few remarks concerning the mineralogical and chemical characters of the Sing-Sing marble, though I believe they are also generally applicable to all the marbles in this county.

24. The Sing-Sing marble is granular, and sometimes so friable that it can be crushed between the fingers. This tendency to disintegration is very manifest in those parts of the strata which lie near the surface of the ground, and have the appearance of beds of sand. This marble, moreover, frequently contains masses of tremolite, quartz, and grains or crystals of iron pyrites, the two former rendering it sometimes difficult to be worked, and the latter, by its decomposition, causing reddish stains, which detract from the beauty of the material. It is, however, found to improve with the extent of the excavations, becoming more compact in its texture, and more free from these foreign minerals.

The ease with which this marble can be worked, its good colour, and perhaps more than all, the facility with which it can be transported, will undoubtedly secure for it extensive use as a building material. The State being largely interested in these quarries, it is manifestly for its interest that the working of them should be conducted in the most judicious, as well as economical manner. By which I mean, that any reasonable outlay should be incurred, if by this means a finer and more durable kind of marble can be thus rendered accessible.

The marbles of Sing-Sing and Kingsbridge belong to the variety called Dolomite, which is characterized chemically by its containing a certain portion of carbonate of magnesia in combination with the carbonate of lime. I made a careful analysis of a specimen from Sing-Sing. It consisted of minute grains, was very friable, of a white colour, with a few dark spots. The composition was found to be as follows:

Silica, alumina, (with a trace of iron,)	0.87
Carbonate of lime,	53.24
Carbonate of magnesia,	45.89
	<hr/>
	100.00
	<hr/>

The lime afforded by the burning of dolomite is thought not to be generally applicable to the purposes of agriculture, in consequence of the magnesia which it contains. It is, however, well adapted to most building purposes, and if the views, recently suggested by Vicat are correct, it is not improbable that it may be found of great value as a

cement. This subject will be noticed more in detail in a subsequent part of the report.

25. Beds of marble equal to those of Stockbridge and Egremont exist in various parts of Dutchess county, as in the towns of Northeast, Amenia, Dover, Pawlings, Beekman and Fishkill.* The Dover quarries are extensively wrought, and the marble which they afford, though dolomitic, is pure white, fine grained, and takes a higher polish than that found at Sing-Sing. Clouded marbles also occur in some parts of this county. All these, now comparatively neglected mines of wealth, would at once be opened up if some easy and direct mode of communication could be established between these quarries and the Hudson river.

26. Beds of marble similar to those above described, occur in the county of Putnam and in the interior of Columbia; while in the latter county, as well as in that of Ulster, dark coloured marbles are found, some of which take a fine polish, and are beautifully variegated with fossil remains. The town of Coeymans, in Albany county, contains a grey marble, which although it does not receive a good polish, is a valuable stone. In Schoharie county, black marble is found in the towns of Broome and Esperance; and the Cherry-Valley marble has long been celebrated.

27. In passing to the western part of the State, we have, in Oneida county, the Trenton limestones, which will furnish beautiful black marbles, and the grey marble near the Holland patent and on a branch of Steuben creek;† and in the counties of Madison and Onondaga the grey crinoidal limestone, which affords a marble scarcely excelled by any in the country for beauty, durability, and the fine polish which it receives. The quarries in Onondaga county are moreover very extensive, and yield blocks of great size. The marble is not only used for ornamental purposes, but in its dressed state is employed in the construction of locks, aqueducts, and other similar structures. The public works now building in the vicinity of Syracuse present a striking proof of the great superiority of this material over that formerly used for similar purposes, while at the same time they offer a no less striking illustration of the great advances which have been made in the arts of construction.

28. I have analyzed two specimens of the grey crinoidal limestone, the one from the quarry, near the Chittenango Falls, in Madison county,

* See *Prof. Mather's Report* for 1838.

† *Mr. Vanuxem's Report* for 1838.

the other from the Split Rock quarry, in Onondaga county. The following are the results: No. 1 is from the former,—No. 2 from the latter.

	1.	2.
Insoluble matters, consisting of silica and alumina, .	0.90	0.40
Oxide of iron,.....	0.35	0.20
Carbonate of lime,	98.50	99.30
	<u>99.75</u>	<u>99.90</u>

29. Wayne and Niagara counties also contain marbles of excellent quality, both for ornamental and ordinary purposes. The Lockport marble contains fragments of organic remains, which give to its surface, when polished, a variegated and beautiful appearance. It also frequently presents on fracture that singular columnar structure, at right angles to the layers, which has been quite aptly compared by Mr. Vanuxem to the sutures of the skull. In consequence of a suggestion made by that gentleman that the appearance in question was owing to sulphate of magnesia,* I subjected a specimen to analysis, and was somewhat surprised to find in it a large proportion of that earth. The composition is as follows:

Silica and alumina,	2.25
Oxide of iron,.....	0.35
Carbonate of lime,	75.65
Carbonate of magnesia,.....	20.70
Moisture and loss,	1.05
	<u>100.00</u>

It will be interesting to ascertain whether this composition prevails in the rocks of this series.

30. In the northern part of the State the localities of marble are no less numerous and important than in the southern and western parts. Thus, in Washington county, there is a fine clouded variety near Granville; in Warren county, dove coloured marbles occur in ledges at the head of Lake George; and in Essex county, near Port Henry, is a white primitive lime-stone, which will probably be, when properly quarried, an excellent and beautiful building stone.

* *Mr. Vanuxem's Report for 1838.*

In Clinton county, there is a black marble with organic remains, which takes a high polish and almost equals the Irish. In Franklin county, near Pottsdam, extensive beds occur of a white marble, which, although easily wrought, has a sufficiently compact structure. And finally, St. Lawrence county contains many localities of a similar kind; but the limestones found here are not usually susceptible of much polish in consequence of the foreign minerals which they contain.

Such is a hurried view of the principal depositories of marble in this State; and even from this it is quite apparent that both as it regards quantity and quality, our resources, in this important article, are ample. Its value to us is as yet scarcely appreciated. Every coming year must serve to unfold it. The number of our public works, and the increasing attention to the beauty and durability of building materials, must operate as inducements to the proprietors of quarries to test the properties of the strata which they contain. Such is the nature of our climate, that it is perhaps of more consequence here than in any other country, that materials for important structures should be carefully examined, and such only be employed as are proof against those destructive agencies which are so incessantly in operation.

31. The minerals of which I have just been treating, also furnish, by calcination, an article scarcely inferior in importance to any other. I refer of course to lime, the quantity of which annually consumed in this State, must be enormous. This quantity, moreover, must constantly increase, in consequence of the new uses to which it is applied; as for example, in agriculture, the preparation of chloride of lime, &c.

The following remarks from a report of Dr. Charles T. Jackson, on the geology of the State of Maine, will serve to convey some idea of the value of this article:

“Few perhaps realize the fact,” says he, “that there are no less than fourteen millions of dollars worth of limestone within twenty feet of the surface in Thomason; and that already, while but a trifling portion of the stone is exported, nearly half a million of dollars are annually realized from the sales of lime; besides which, we also have to estimate the value of the carrying trade, the whole business being in the hands of the citizens of Maine.” “The lime,” the same gentleman remarks, “serves to supply nearly all the cities on the Atlantic coast with the lime used in their buildings, and for agriculture.”*

* *Second report on the Geology of the State of Maine, by Charles T. Jackson, M. D. &c. 1838.*

It should be observed that a great improvement has been introduced into the process of burning lime, which consists in the use of refuse screenings or dust of anthracite for fuel, instead of wood, and the employment of a perpetual kiln. The coal dust is said to have cost \$1.75 per ton in the city of New-York, while from fifty to seventy-five cents per ton were paid for its transportation to Thomason.

Here, then, we have the singular fact that fuel is transported from the city of New-York to Thomason, and the lime procured by its agency again transported to the city. Now, the lime thus obtained must be greatly superior to that which is produced from our limestones, or else our citizens have been strangely neglectful of their interest in this respect. I have reason to believe that the counties of Westchester, Orange and Dutchess, contain limestones which would yield lime equal to any elsewhere manufactured. And with the improvements already introduced into our limekilns, as well as in those of Maine, one would suppose that our lime could be afforded at a much cheaper rate in the city of New-York, than that which is transported from a distant part of the United States. This subject commends itself to the enterprise of our fellow-citizens.

As my object is to notice the useful minerals of the State, I shall proceed to offer a few remarks upon a subject closely allied to the above, and the importance of which will, I think, be generally acknowledged. It is

THE HYDRAULIC, OR WATER LIMESTONES.

32. It is well known that the lime obtained by the calcination or burning of the different kinds of limestone, differs greatly in its properties. When the limestone is pure, the resulting lime is also of uniform purity. Upon the addition of water to such lime a high degree of heat is produced, its bulk is greatly increased, and it at length falls to powder. This powder, when mixed with water, and a due proportion of sand, and afterwards exposed to the air, gradually acquires a stony hardness; but this result is not produced when the mixture is submitted to the action of water. Now these are designated by the name of *air limes*, and their relative value depends in some measure upon the kind of limestone, and the particular mode of calcination.

But certain impure limestones when subjected to calcination afford limes which, while they do not undergo much change by simple exposure to the air, do not slake when moistened with water, but when reduced to powder, absorb this liquid without producing much increase

in volume, and without the evolution of much heat; and they moreover form with it a paste possessing little tenacity, and which when placed under water, hardens after the lapse of a few days. These are now known by the name of *Hydraulic, or Water Limes*. They differ much in the rapidity with which they harden under water, and in the degree of solidity which they ultimately attain.

There are still other limestones which afford limes, possessing the remarkable and very useful property of becoming hard almost instantly, like plaster of Paris, whether exposed to the air or in contact with water. These are sometimes called *Roman Cements*. It should be remarked, however, that the French generally employ the term *ciment*, to designate fine pounded bricks or tiles; while in this country, the term *cement* is most commonly used in a generic sense, and includes the hydraulic constituent of mortars, whatever that may be.

It must always be considered as a most fortunate circumstance, that so soon after the commencement of the Erie canal, a material was found in its immediate vicinity, which yielded a lime well suited for the construction of locks and aqueducts. It is worthy of inquiry, however, whether in these and in similar works since constructed, sufficient attention has been paid to the selection and preparation of the hydraulic limes thus employed.

33. There is still some difference of opinion, as to which of the ingredients of these impure limestones, the hydraulic property is to be ascribed. Some of those who have examined the subject, have fixed upon the oxide of iron, as the important ingredient; while the claims of the oxide of manganese, silica, alumina, magnesia, and even soda, have each been urged by respectable authority. It is, after all, however, more than probable, that the hydraulic property is not due to a single ingredient, but belongs rather to several substances, or to a class of compounds.

It appears, from the experiments of Berthier and Vicat, the highest authorities upon this subject;—That no mixture, of which silica does not form a part, acquires hydraulic properties;—That limes containing only silica or alumina, or better those containing silica and magnesia, acquire a much greater degree of hardness than the silicates of pure lime; and that the oxides of iron and manganese contribute nothing to the hardening of these bodies.

More recently, M. Vicat has asserted, that magnesia alone, when in sufficient quantity, will render pure lime hydraulic. The proportions of magnesia which he recommends, are from thirty to forty per cent of

it weighed after calcination, to every forty of pure anhydrous lime. "M. Vicat also points out the importance of these observations;—hydraulic lime never having been found in the calcareous formation below the lias, is because the dolomites have never been examined; but it is now probable that it may be found in this lower formation."*

It would be impossible in the compass of a report like the present, to enter fully into the consideration of this subject. Several important works have recently appeared in reference to it, which should be attentively studied by all who have the direction of aquatic structures. In France, where the arts of construction have for several years received such distinguished attention, much has been done towards establishing correct principles in regard to the preparation and mode of using hydraulic limes, cements and mortars. Valuable information will be found upon these points, in the extensive treatises of Dumas and Berthier, and in the able work of Vicat. Important service has also been rendered to the arts of construction in this country, by Col. Totten, who has translated and published in the *Journal of the Franklin Institute*, for 1837 and 1838, a very excellent memoir on hydraulic and common mortars, by General Treussart; and the same valuable periodical contains several other papers on those subjects which may be advantageously consulted.

34. As the proper selection and management of hydraulic limes is a matter of vast importance, I trust I shall be excused in adverting to a few points, to which there is reason to fear that sufficient attention has not been heretofore paid, in the construction of our public works.

1. It is agreed on all hands, that there is a great difference in the hydraulic limes obtained from different limestones, and that the value of each, and the proper mode of using it can be determined only by experiment.

2. It is admitted that in all cases the process of burning or calcining the limestone requires great care. A limestone, very proper in other respects, gives, when the heat is urged too high, what is called a *dead lime*, in consequence of the partial fusion of the mass; whereas, when the calcination is effected at too low a temperature, the resulting lime is meagre and not hydraulic.

3. Hydraulic lime should be used as soon as possible after calcination, and when kept for any time, it should be carefully protected from the

* *London and Edinburgh Philosophical Magazine, &c. 3d Series, viii. 591.*

action of the air. It has been ascertained that the hydraulic property of limes is much weakened by their being exposed to the air, and consequently, all other things being equal, recently prepared hydraulic lime is to be preferred for important structures, to that which has been for some time manufactured.

4. It is generally agreed that the rapidity with which hydraulic mortar hardens, and the ultimate degree of hardness which it acquires, depend greatly upon the proper proportions of lime and sand, their intimate incorporation, and the amount of water employed in their mixture. All these are points which must be settled by previous experiments.

35. The leading principle involved in the hardening of these hydraulic compounds, seems to be, that certain earthy substances, and especially silica, combine with the lime to which the carbonate of lime in these hydraulic compounds is brought by calcination, and that the silicate thus formed, is converted into a solid hydrate by combination with water. The *setting* of boiled plaster, when made into a paste with water, affords the best illustration of the kind of change which these hydraulic compounds undergo during the process of hardening in contact with water. The selection of the raw material and the different steps of its preparation, must have in view the complete fulfilment of this necessary condition.

I shall now proceed to notice some of the most important localities of hydraulic limestones in this State, and give the results of the analyses made in reference to this subject.

36. Hydraulic limestone is found in great quantities, in Ulster county, and the manufacture of cement has for several years been there quite extensively carried on. Recently, however, it has increased in a surprising manner, though it is probably, still only in its infancy.

The principal quarries of hydraulic limestone, at present opened in this county, are situated on the Rondout, and the Hudson and Delaware canal, but the strata are undoubtedly of great extent. The mode of preparing the cement is sufficiently simple. The limestone is first reduced to small fragments, which are then thrown into a kiln, with layers of the screenings of anthracite intermixed. At an interval of twelve hours, the lower layers of the kiln are removed, and fresh portions of the limestone thrown into the upper part. These operations are so managed, that each layer is subjected to heat for about three days.

The lime thus calcined, is of a light drab colour, and when reduced to powder and mixed with about one-third its bulk of sand and made into paste with water, soon becomes hard. The grinding is performed in a mill, and the powdered cement is put up in barrels, which are lined with paper, to exclude as much as possible, the contact of air. The cement thus prepared, is sold at \$2.25 the barrel.

It is estimated that about 3,000 barrels of cement are manufactured in this district, weekly. Supposing this to be continued for only six months in the year, the income arising from it will amount to nearly \$150,000. As an evidence of the good quality of this cement, it may be stated, that it is employed in the construction of the Croton aqueduct and in the United States works, near Boston.

37. I analyzed a specimen of this hydraulic limestone, or cement, as it is sometimes called, from the quarry of Messrs. Moser & Burnett. It had a blueish colour, with occasional gray and reddish spots. The texture was close and compact, and its fracture even or conchoidal. The following are the results which were obtained in 100 parts.

Carbonic acid,.....	34.20
Lime,.....	25.50
Magnesia,	12.35
Silica,	15.37
Alumina,	9.13
Oxide of iron,.....	2.25
Bituminous matter, moisture and loss,	1.20
	<hr/>
	100.00
	<hr/>

The calcined cement contained only five per cent of carbonic acid, and its composition may be thus expressed.

Carbonic acid,.....	5.00
Lime,.	37.60
Magnesia,	16.65
Silica,	22.75
Alumina,	13.40
Oxide of iron,.....	3.30
Loss,	1.30
	<hr/>
	100.00
	<hr/>

By calcination, therefore, this limestone is reduced to a state approaching that of a double silicate and aluminate of lime and magnesia, and the theory of the hardening of this cement is sufficiently in accordance with the views above suggested. The cement, moreover, forms a jelly with muriatic acid, which still further proves that its chemical nature has been changed during the calcination.

38. An important practical inference from these experiments and observations is, that the more completely the carbonic acid is driven off from the limestone by calcination, without causing its fusion, the more energetic will be the resulting product. It is probable that a long continued, rather than a very high, heat, will best effect this object.

39. It remains to be mentioned, that the limestone which over lies this cement has a blue colour, a structure somewhat granular, contains organic remains, and occasionally nodules of calcareous spar and sulphuret of zinc, with alternating layers or masses of hornstone. On analyzing a fragment of this rock, I found it to consist of carbonate of lime, with a minute portion of oxide of iron and bituminous matter, and with about eight per cent of argil, or silica and alumina. It does not contain even a trace of magnesia, although so closely associated with the magnesian stratum above described.

40. Water limestones occur in Albany county, in the Helderberg;* in Montgomery county, about ten miles northwest of Schenectady; also in Herkimer county, some of which Mr. Vanuxem thinks would afford cements equal to any elsewhere made in the extensive range to the west; while, according to the same geologist, they are found in immense series in Oneida county.†

41. The hydraulic limestone of Madison county has long been in high repute. One of the most important localities, and I believe one of the first, if not the very first, discovered in the State, is situated about a mile and a half southwest of the village of Chittenango. It has usually a drab colour, sometimes striped with reddish bands, a conchoidal fracture, an earthy texture, and is covered by layers of the calciferous slate of Eaton. The process of burning and grinding is similar to that heretofore described. When this cement is used in the construction of works, it is mixed with from two to three parts of sand.

* I have not yet had an opportunity of analyzing a specimen from this locality. According to an analysis of Prof. Eaton, which, however, he did not deem very accurate, it contains 25 per cent carbonic acid, 26 lime, 23 silica, 13 alumine and magnesia, 1 iron, and 2 water.—*Transactions of the Albany Institute, vol. 1, app. p. 53.*

† Mr. Vanuxem's Report for 1833.

It is computed that 100,000 bushels of hydraulic lime are annually sent from this town. The average price is fourteen cents a bushel, which therefore yields a return of \$14,000.

42. The following are the results of two analyses of hydraulic limestone from this county; the first, by Mr. H. Seybert;* the second, by myself.

	1.		2.
Carbonic acid,....	39.33	.....	38.65
Lime,.....	25.00	.....	27.35
Magnesia,	17.83	.....	16.70
Silica,	11.76	.....	8.95
Alumina,.....	2.73	.....	4.90
Peroxide of iron,..	1.50	.....	1.75
Moisture,.....	1.50	Moisture, bituminous matter & loss	1.70
	<u>99.65</u>		<u>100.00</u>

The composition of the calcined lime in the state in which it is ordinarily used as a cement, is as follows:

Carbonic acid and moisture,.....	10.90
Lime,	39.50
Magnesia,	22.27
Silica,	16.56
Oxide of iron and alumina,	10.77
	<u>100.00</u>

The proportion of carbonic acid, however, depends entirely upon the manner in which the calcination is conducted, and it probably differs considerably in different specimens.

43. The blue fetid limestone which is associated with the water lime is a nearly pure carbonate of lime, containing 0.70 per cent of insoluble matter, and a trace of oxide of iron and bitumen, to which last is probably to be ascribed the odour which it gives out when struck with a hammer. It contains no magnesia.

44. I have also analyzed a specimen of the calciferous slate of Eaton, from the hill on the east side of the village of Chittenango. The results are as follows:

* *Transactions of the American Philosophical Society. New Series, 11, 229.*

Carbonic acid,.....	40.95
Lime,	29.00
Magnesia,	17.30
Silica and alumina,	11.00
Oxide of iron,.....	1.10
Moisture and loss,.....	0.65
	<hr/>
	100.00
	<hr/>

If this composition is constant, it is not difficult to account for the occurrence of sulphate of magnesia or Epsom salt, which is so often found in efflorescences on this rock. It contains a sufficient amount of sulphuret of iron to furnish the acid for this decomposition.*

45. An important locality of water limestone occurs about a mile and a half west of Manlius in Onondaga county. The overlying rock is a blue limestone, similar to that found at Chittenango. Some of the strata of water limestone are clouded or striped, while others are of a uniform gray or drab colour. Through the upper layers there passes a thin seam of white calcareous spar, in which are to be found small crystals of fluor, of a dark purple colour.

The cement manufactured at this quarry is used in the construction of the aqueduct at Syracuse, and in that of several of the locks on the enlarged canal.

* Since the above was written, I have analyzed a specimen from the bed of the river at Rochester, Monroe county; called "calciferous slate" by Prof. Eaton, and "calcareous shale" by Mr. Hall. It is greyish blue, granular, a little crystalline, and emits a strong bituminous odour when struck or subjected to heat. Its composition is as follows:

Carbonic acid,	35.00
Lime,	25.20
Magnesia,	14.50
Silica, with a little alumina,.....	24.00
Oxide of iron,.....	1.00
Bituminous matter,	0.30
	<hr/>
	100.00
	<hr/>

I have also analyzed a specimen of the tufa or petrified wood found at the base of the hill of calciferous slate at Chittenango, for the purpose of ascertaining whether magnesia was one of its constituents. The following is its composition.

Carbonic acid,	42.05
Lime,	53.95
Silica, alumina, and vegetable matter,.....	2.10
Oxide of iron,.....	0.80
Moisture and loss,	1.10
	<hr/>
	100.00
	<hr/>

It does not contain even a trace of magnesia.

46. The Manlius water limestone has the following composition:

Carbonic acid,	39.80
Lime,	25.24
Magnesia,	18.80
Silica and alumina,	13.50
Oxide of iron,	1.25
Moisture and loss,	1.41
	<hr/>
	100.00

47. According to Mr. Hall the formations from which water limestone has been selected, extend across Monroe county from east to west: the one through the towns of Penfield, Brighton, Gates, Ogden and Sweden; the other through Mendon, Rush and Wheatland. At one locality in Ogden this limestone has been burned and used for cement in the locks on the Erie canal, and is said to have been of good quality. The same kind of stone may be found at the upper falls of the Genesee, at Rochester.*

In Orleans county, some of the upper layers of the rock at the falls of Oak Orchard creek, at Shelby, are also used for the manufacture of water cement.

48. Finally, the same limestone occurs near Waddington, in St. Lawrence county, and is probably continuous with the stratum found near Kingston in Upper Canada, which is used in the public works and is highly esteemed.†

Such are some of the most important localities of this valuable mineral product. The number of these will no doubt hereafter be much increased, and perhaps many quarries, now little valued, will be found upon examination and trial to furnish cements equal to those at present so generally employed. It cannot be too often repeated, however, that a detailed and careful series of experiments should be made before a cement, from whatever locality obtained, is used in important works.

GYPSUM, PLASTER OF PARIS, OR SULPHATE OF LIME.

49. This important article, for which until within a few years past we were almost entirely indebted to Nova Scotia, may now be ranked among the great mineral products of our State.

* Prof. Hall's report for 1833.

† The value of the water lime manufactured in St. Lawrence and exported to Canada, is said to be \$40,000 annually. See *Report of the St. Lawrence rail-road committee, December, 1833.*

Gypsum, when pure, has a snow white colour, but it is often tinged with red, yellow, blue and grey, in consequence of the admixture of foreign substances. When crystallized, it is foliated, but it also occurs granular and compact. The foliated varieties are called *selenite*, while the compact ones are often known by the name of *alabaster*. It is distinguished from carbonate of lime by its being less hard, as it may be scratched by the finger nail; acids, when applied to the carbonate of lime, cause an effervescence, owing to the escape of carbonic acid,—but no such effect is produced by a similar application to the sulphate of lime.

The variety of sulphate of lime which is most abundant, is composed of sulphuric acid and lime, with about twenty per cent of water. Whenever it is used for architectural purposes, this water is driven off by the application of heat, the operation being commonly known by the name of *boiling*. The calcined or boiled plaster, when made into a paste with water, speedily hardens, and it is employed in this way for walls, for stucco, for taking casts of statues, in stereotyping, &c. Gypsum is moreover largely used in agriculture, and it is considered an invaluable fertilizer.

Of this useful mineral we have numerous and very important localities. They are, however, almost exclusively confined to the district bordering on the Erie canal. I am aware that it occurs in the counties of Columbia, Albany and Schoharie, but however interesting the specimens here procured may be for the cabinet of the mineralogist, the quantity is nowhere sufficient to answer any other purpose.

50. The west end of the town of Starke, in Herkimer county, is the most eastern point at which gypsum has been found in any great quantity. According to Mr. Vanuxem, it occurs in a white sandstone, the grey band of Mr. Eaton, and he represents it as being white and equal to the Nova Scotia both before and after calcination. From twenty to thirty tons had been obtained by Mr. Crill, the proprietor, during the summer of 1837.

51. In Oneida county, gypsum is found in beds of vast extent. It is sometimes pure, being foliated and transparent; but the largest proportion is dark coloured, and is mixed with carbonate of lime, constituting what is usually called *plaster stone*. This last is used for agricultural purposes, and when deprived of its water by calcination, as a cement.

52. Localities of this mineral abound in the county of Madison. It is sometimes foliated and granular, but usually, as in the above county, it belongs to the common or impure variety. It occurs imbedded in gypseous marl, every where forming irregular or somewhat rounded or conical masses rarely more than forty or fifty feet in diameter, and usually from ten to twenty feet in height. These hillocks seem to be detached, and the conclusion is almost irresistible that they have been formed after the upper strata of rock have been deposited. The masses of gypsum are a foot or more in thickness, and weigh from four to six hundred tons. I can give no details concerning the amount of this mineral annually raised in this county, but in the town of Sullivan alone it is said to be from four to seven thousand tons.

On the route from Chittenango to Syracuse, in Onondaga county, conical elevations similar to those already noticed are of frequent occurrence; some of which have already been opened and found to contain deposits of gypsum, while others are left as the reward of future enterprise and labor.

53. The interesting region around Onondaga lake, of which I have heretofore attempted to give an account, contains, in addition to its other sources of wealth, some important deposits of gypsum. At Liverpool, the fibrous variety, then comparatively rare in this State, was found several years since, about twelve feet below the surface of the earth, associated with marly clay. Recently the excavations made for the construction of the rail-road from Syracuse to the Split-Rock quarry, have opened an extensive bed of the same valuable mineral. At this locality are to be found several varieties; as the foliated, the fibrous, the snowy, and the common or dark coloured—the whole imbedded in a kind of gypseous marl which effervesces freely in acids, and contains variable proportions of the oxide of iron. Gypseous beds, similar in their general characters, also occur in the vicinity of Manlius, from which large quantities have been exported. But probably the most valuable deposits that have yet been opened up are those along the line of the Syracuse and Auburn rail-road, near the village of Camillus. We find here, among other varieties, noble specimens of transparent selenite, and what renders the locality peculiarly interesting, are the associated strata of calcareous tufa, and of the singular hopper-form crystals of marly clay. From forty to fifty thousand tons of gypsum have been obtained simply from the excavations which were necessary for the construction of this road. And this may be considered as merely a specimen of what is still hidden in the adjoining hills.

54. Beds of gypsum occur in various parts of Monroe county. Specimens of the foliated variety, with a rose colour, have been found below the Genesee Falls at Rochester, and nodules of snowy gypsum are quite common in the calciferous slate at the same place. Gypsum is also obtained in small quantities in the towns of Pittsford, Riga and Chili; but, according to Mr. Hall, the workable beds of this mineral are almost wholly confined to the southern part of the county. "Along the valley of Allen's creek and Mill creek, two miles north, most of the plaster of Monroe county is obtained. Both these places are in the town of Wheatland. At present, about 5,000 tons of plaster per annum are obtained from this town; of this quantity, 4,000 tons are used in Monroe county."*

55. In the counties of Cayuga, Wayne, Livingston, Ontario, Seneca and Tompkins, beds of gypsum have been found in various places; but I have no means of determining even the probable quantity which they yield.

56. The localities of this mineral in Niagara county are of considerable interest to the mineralogist. At Lockport, beautiful specimens of transparent selenite and snowy gypsum have been found, associated with pearl spar, sulphate of strontian, and the rare anhydrite or anhydrous sulphate of lime. Snow white granular gypsum also occurs near the Falls of Niagara, with occasional specimens of foliated selenite of a fine sky-blue colour. At all these localities, the gypsum is imbedded in the geodiferous lime-rock of Professor Eaton, but it does not, to my knowledge, occur in quantities sufficient for useful purposes.

57. A very imperfect idea of the quantity of gypsum which exists in this State, will be obtained from the sketch which has now been given. Even if we had the means of ascertaining exactly the number of tons at present annually raised, which I think cannot be less than 50,000, it should be borne in mind that regular explorations are seldom undertaken, and that the amount, whatever it may be, is mainly the result of accidental discovery, and of occasional labor by the farmer during the intervals of his other avocations. Immense beds still lie unopened, which will at some future day yield their treasures. Perhaps one reason why greater attention has not been paid to the enormous deposits of gypsum and marl which exist in the western part of the State is, that the soil is naturally so fertile as seldom to require the employment of those artificial means of renovation which in most other

countries are necessary to the success of the agriculturist. Still it cannot be doubted that in many situations even here, much advantage would be derived from the use of these efficient fertilizers. Lime, marl and gypsum, all of which can be so easily and so abundantly obtained in the region in question, have almost entirely changed the agricultural character of the States of New-Jersey and Pennsylvania; but it appears to me that in no part of our State which I have visited, is the value of these articles duly appreciated.

It may not be out of place here to offer a few remarks concerning the origin of gypsum.

58. From the uniformly regular appearance which the beds of gypsum present throughout the western counties, the similarity in their geological associations, and the apparent heaving up of the strata which enclose them, it has been inferred that they are the result of agencies now in operation. The opinion indeed prevails quite generally among the inhabitants of the districts where plaster beds are of most frequent occurrence, that they increase from year to year, and that it is unsafe to commence important structures in situations where they are supposed to exist.

It seems not improbable, that the sulphate of lime has been formed subsequently to the deposition of the strata of limestone in which it is found, and that it may belong to that class of bodies whose formation is continually going on. The decomposition of the sulphuret of iron, and the subsequent action of the sulphuric acid thus produced, upon limestone, has by some been proposed as the mode in which this is accomplished. But a formidable objection to this view is, that iron pyrites, although a very common mineral, is not yet found in sufficient quantity to account for the vast results which have been ascribed to it. Thus in the western part of New-York, the occurrence of gypsum, the formation of vast beds of iron ore, and the production of the immense number of sulphur springs which are known to exist there, have all been referred to the decomposition of this single mineral.

If all these phenomena were really due to the decomposition of iron pyrites, it would be fair to infer that this substance existed in enormous quantities, and that beds of oxide of iron, resulting from this decomposition should uniformly be found in the immediate vicinity of our plaster beds and sulphur springs. But the facts in the cases do not accord with the theory.

59. In the account which I gave, in my last report, of our sulphur springs, or those which evolve sulphuretted hydrogen, it was remarked that the common explanation of the production of this gas, viz: the decomposition of iron pyrites, seemed to me to be quite unsatisfactory. The doubts then expressed, have been rather confirmed than removed by the discovery of several other springs of the same kind, in various parts of the State. During the past season, I visited, in company with Mr. Vanuxem, Dr. Wright of Syracuse, and Mr. W. P. Wainwright of New-York, a lake or pond, two miles east of Manlius Centre, known in that vicinity, by the name of Lake Sodom or Green Pond. This pond is about a mile and a half in length, and half a mile in breadth, at the widest part. The water is of a deep green colour, which is probably owing to the partial decomposition of the sulphuretted hydrogen which it holds in solution. The depth of the water gradually increases as we proceed from the northern outlet, from twenty-five to a hundred and sixty-eight feet; the latter depth continuing for some distance around what we supposed to be the centre of the basin. Water drawn from the depth of 168 feet, was found to be strongly charged with sulphuretted hydrogen. On being afterwards tested, it blackened nitrate of silver powerfully, and gave copious precipitates with solutions of oxalate of ammonia and muriate of barytes, indicating the presence of sulphuretted hydrogen, and sulphate of lime. Its specific gravity was scarcely above that of distilled water, and it contained not even a trace of iron.

Here then is a natural sulphur bath, of a mile and a half in length, half a mile in width, and 168 feet in depth; and this, let it be remembered, is neither a solitary, nor as it regards extent, an uncommon locality, in the western part of the State. Surely there must be some very general and powerful cause in operation, to produce such vast results. The few scattered grains of iron pyrites, which some of our rocks contain, are as entirely inadequate to these phenomena, as they are to those of the volcano and the earthquake.

60. As all our sulphuretted waters, without exception, contain sulphate of lime, and as sulphur springs are most numerous and extensive in those parts of the State where gypsum beds abound, it is, I think, a fair inference, that the production of gypsum and the evolution of sulphuretted hydrogen are referable to the same general agency. Now as it is known that the decomposition of the sulphuret of calcium, or the compound of sulphur, and the metallic basis of lime, by water, will give rise to sulphuretted hydrogen and sulphate of lime, it is not improbable that there exists beds of this substance, at different and unknown

depths, to which all these phenomena may be ascribed. The access of water to these beds of sulphuret of calcium, causes its decomposition, and as a necessary consequence, gaseous sulphuretted hydrogen is evolved. This gas, in its course to the surface, is partly absorbed by water, while, from its reaction upon that liquid, a portion of sulphuric acid is also formed, a result which we constantly observe in the laboratory. The sulphuric acid thus formed, acting upon the upper strata produces sulphate of lime, and causes the evolution of carbonic acid, a substance which is almost always found in the mineral waters of the west.

This view appears to me conformable to the known laws of chemistry, and is sustained by the facts which are presented. The only assumptions, are the existence of the sulphuret of calcium, in quantities sufficient to produce these results, and the agency of water. In regard to these, I will here only remark, that they are supported by the same train of argument, that is brought to bear upon the chemical theory of volcanic action; of which action, many evidences, in addition to those above noticed, are presented in various parts of our State.

EARTHY MINERALS.

61. The minerals included under this class are composed chiefly of one or more of the earths proper; frequently, however, containing some alkali, alkaline earth, acid or metallic oxide. They have also sometimes been termed earthy compounds or stones, and they are probably more interesting to the mineralogist than those belonging to any other class. In some cases, the composition of these minerals is very complex, which renders their analysis difficult. At the same time, this very circumstance makes their careful study the more important, and as slight differences in chemical composition not unfrequently form the basis of specific distinctions, increases the chances of new discoveries. To show that I have not been inattentive to this part of my work, I beg leave to state, that a portion of every season since its commencement has been devoted to the collection and study of the minerals belonging to this class. Seven or eight weeks of the last summer were spent among the rich localities of Orange county, in company with my friend, Dr. Wm. Horton, who is so well acquainted with the minerals of that county, and who was then engaged in examining its geology as the assistant to Prof. Mather. I should do injustice to my own feelings, did I not thus publicly acknowledge the important assistance which I have at various times received from Dr. Horton, who has perhaps done as much, if not more, than any other individual towards bringing into notice the vast mineral resources of Orange county.

Upwards of twenty boxes of minerals, belonging chiefly to the above class, were obtained during the past season, and are deposited in the geological rooms, in the capitol. But as I proposed to confine this report principally to our useful minerals, I shall at present notice only those which can properly be arranged under this head.

MAGNESIAN MINERALS.

62. Several minerals are found on Staten-Island, and also in other parts of the State, which, in consequence of their containing large proportions of magnesia, may properly enough for my present purpose be grouped together under the name of magnesian minerals. Some of these may be turned to account in the arts.

The mineral called serpentine constitutes the principal ridge of hills on Staten-Island, extending from New-Brighton to a little west of Richmond, a distance of eight miles. It assumes a great variety of aspects, from black to nearly white, and from compact to earthy. Some of the talcy varieties are commonly known by the name of soap stone. Talc, carbonate of magnesia and hydrate of magnesia abound in it, and the rock might be used with profit in making magnesian salts.*

The suggestion here made in regard to the preparation of magnesian salts from the minerals so abundant on Staten-Island, is deemed of great consideration. These minerals contain from one-third to two-thirds of their weight of magnesia, as will be seen from the following results of their analysis.

* *Prof. Mather's Report for 1833.*

	Magnesia.	Lim.	Carbonic acid.	Water.	Silica.	Protoxide of iron.	Peroxide of iron.	Peroxide of iron and alumina.	Foreign matters and loss.	Total.
Hydrate of magnesia,	70.00	.....	.....	30.00	.....	.....	.....	.....	.....	100*
Hydrocarbonate of magnesia, . .	42.41	.....	36.82	18.53	0.57	.....	0.27	.....	1.40	100†
Compact carbonate of magnesia, .	44.00	3.50	50.00	.....	2.00	0.50	.....	.....	.....	100‡
Magnesite or kersolite,	41.26	2.39	.....	13.50	41.00	.....	.....	1.85	.....	100§
Common serpentine,	42.16	.....	1.03	12.33	42.26	1.98	.....	.....	.....	|| 99.76

* Bruce, in *American Mineralogical Journal*, i. 26.

§ By my analysis. The specimen was from Staten Island.

† Wachmeister, see *Silliman's Journal*, xviii. 167.‡ *Thomson's Mineralogy*.§ Nuttall, in *Silliman's Journal*, iv. 17.

The magnesia contained in either of these minerals would furnish, by combination with sulphuric acid, upwards of two hundred parts of sulphate of magnesia or epsom salts, in the form in which it is ordinarily sold in the shops. Moreover, the sulphate of magnesia, thus obtained, may be decomposed by carbonate of soda or potash and produce carbonate of magnesia, which, as well as the sulphate, is used for medicinal purposes.* By this operation, when serpentine is employed, a large quantity of Venetian red is also procured, as that mineral contains a considerable proportion of oxide of iron. This manufacture is now carried on near Baltimore, in Maryland, and there seems to be no reason why it may not be profitably pursued in the vicinity of New-York.

63. Serpentine, similar in every respect to that found on Staten-Island and at Hoboken, in New-Jersey, occurs in considerable abundance in the counties of New-York, Westchester, Putnam, Rockland and Orange; and extensive deposits of the same mineral are also found in the county of St. Lawrence.

The beautiful green colour of serpentine, and the fine polish which it takes when pure, give it great value as an ornamental marble. When mixed with granular limestone it forms the celebrated *verd antique*. Unfortunately in almost all the localities in the southern part of the State, at least so far as they have been explored, the serpentine, although in great abundance, is so mixed with carbonate of magnesia, asbestos and other magnesian minerals, as to render it unfit to be worked as a marble. Thus a block obtained from a quarry in the county of Westchester, concerning which high expectations had been raised, was found to have an unequal degree of hardness in its different parts, and to be filled with seams and nodules of other magnesian minerals which could not be polished, or were too friable to sustain the rough usage which is required for the dressing of marble.

Prof. Emmons informs us that there are several localities in St. Lawrence county in which the soundness of the serpentine rock is remarkable; and the only impediment to the introduction of this article for ornamental and useful purposes, he thinks, is the expense of transportation. At Pitcairn is a fine locality of *verd antique*. The colours are green and white, arranged in the usual forms of clouded marble. The serpentine has a bright green colour, and belongs to the variety usually called pre-

* Should the preparation of these salts of magnesia become important, the dolomites or double carbonates of lime and magnesia which occur at Sing-Sing and elsewhere, may be also advantageously employed for that purpose. The double carbonate is first to be calcined and then treated by sulphuric acid, or sulphate of iron. There is thus formed an insoluble sulphate of lime and a soluble sulphate of magnesia, which can be easily separated.

cious. The carbonate of lime is white, and forms a handsome ground for the translucent serpentine.*

64. Usually associated with serpentine, when it occurs in extensive beds, is a mineral which has nearly the same chemical composition, generally known by the name of soapstone. This is particularly the case in the counties of Richmond and St. Lawrence. In consequence of its softness and tenacity soapstone may be turned or cut into articles of various shapes, and rendered hard by exposure to heat. It is hence much used for the hearths of furnaces, the sides of fire places, the linings of stoves, and for similar purposes.

65. Another substance often found with these magnesian minerals is asbestos, under which I include the variety composed of flexible silky fibres, sometimes known by the name of amianthus, there being no line of specific distinction to warrant its separation. This mineral has acquired notoriety from the fact that some of its varieties may be woven into cloth which is indestructible by heat. It is to uses similar to these that it is accordingly applied, being employed in the preparation of the incombustible cloth proposed for firemen's robes, and for the lining of the metallic safes now so generally introduced into counting houses.

MATERIALS FOR THE MANUFACTURE OF PORCELAIN.

66. The localities of clays suitable for the manufacture of brick and the common kinds of earthen ware, are too numerous in this State to be at present noticed, and their description belongs rather to the department of geology than to that of mineralogy. Many of these have already been noticed in the reports of the geologists, and Prof. Mather has presented some details which show the importance of the branch of industry included under the art of brickmaking.

The manufacture of the finer kinds of pottery has not heretofore been carried on with much success in our country. Whether this be owing to the superior facilities which are possessed by the English and French in regard to materials, or to the reduced price of labour, it is not easy to determine. My present object is merely to show that New-York is not destitute of the materials necessary for this branch of art.

The finer kinds of pottery require for their manufacture the purest clays,—such as contain little or no oxide of iron and which consequently do not turn red in burning. To these a portion of pure silica is added, which is prepared for the purpose by heating masses of flints or

* *Prof. Emmons' Report for 1838.*

quartz, quenching them in water and then reducing them to powder in a mill.

67. Clays of a good quality occur abundantly in various parts of Staten and Long-Island, and upon proper trial they would no doubt be found to answer the purposes of this manufacture. There are also several localities in Orange county where similar materials may be obtained.

Near Southfield furnace, in the latter county, is a bed of decomposed feldspar known by the name of porcelain earth, which will probably be of great value in the manufacture of pottery. This substance is of a pure white colour when dry, a little unctuous, and is supposed to be abundant.

68. As for feldspar used in glazing and also in the body of the finer kinds of pottery, we have several localities in Orange county, in Warren county, near Caldwell, and also in the counties of Jefferson and St. Lawrence; while quartz, of a good quality and in sufficient abundance for the same purpose, is found in Orange, Columbia and other counties.

69. Those who are at all acquainted with the history of the arts both in this and in other countries, must be aware that their progress has oftentimes been extremely slow, and it will not be surprising if the manufacture in question, although now of so little value to us, should become an extensive and important one. Previously to about the year 1760, England depended wholly upon other countries for the finer kinds of pottery;—the English ware being generally of an inferior quality. But in a few years after the investigations and consequent improvements of Mr. Wedgewood, the current of importation of even the finer earthen wares was changed in that country to exportation, and their manufacture has at length become of such vast extent that it is not easy to calculate its value.

So it has been with many of the arts now successfully prosecuted in our own country. A great number of articles, for which we were but a few years since entirely dependent on foreign nations, are now manufactured by our mechanics and in our own workshops.

METALLIC MINERALS.

In my report for 1837, I described the principal localities of the ores of iron and lead in this State, at least so far as I was then acquainted with them. Much additional information has been acquired in regard to these minerals by the subsequent investigations of those who are engaged in the survey. I have myself visited several localities during the last

year, and have analyzed some of the most important of our metallic substances, not previously examined, as will appear from the following notices.

Iron.

70. I omitted to mention in my report for 1837, that native iron had been found in this State. Although there has been some dispute concerning the occurrence of pure or metallic iron in nature, it is now generally admitted among the number of rare minerals. The United States have afforded some interesting examples of native iron which are undoubtedly of terrestrial origin; such are the specimens which have been found in Canaan, Conn. and in Guilford county, North Carolina. They differ from those masses which are supposed to be of meteoric origin, in being attached to some rock, or in being entirely destitute of nickel or chromium, which are constant ingredients of these meteoric stones.

In the museum of the Albany Institute is a specimen of native iron obtained from Burlington, in Otsego county, and presented by Prof. Hadley of Fairfield. The mass is evidently malleable and has the appearance of pure iron, although I am not aware that it has been chemically examined. Mr. T. G. Clemson has described a specimen of native iron found on the farm of William Rouse, in Penn-Yan, Yates county. The rocks at this place are sandstone, and the iron was found beneath and on the surface of the earth. It was of the colour and had the appearance of ordinary malleable iron. It was free from the oxides and acted upon the magnetic needle. It contained a minute portion of carbon, but neither nickel nor cobalt could be detected in it.*

71. As it regards the oxides of iron, from which all the iron manufactured in this State is obtained, the northern and southern sections seem to vie with each other in the extent and importance of their depositories. While at the north we have the immense beds of the magnetic oxide, at Newcomb, in Essex county, one of which is described by Mr. Hall as being more than a mile in length and upwards of five hundred feet in breadth, besides others of less magnitude in various parts of the same county, and in those of Clinton and Franklin, and the beds of specular iron in St. Lawrence;—we have at the south the vast deposits of magnetic oxide in Orange county, and of hematite in the county of Dutchess.

* *Transactions of the Geological Society of Pennsylvania*, 1. 358.

72. Several beds of magnetic iron ore have recently been opened in the county of Orange. Some of these I visited during the last year, and from the observations then made I have no doubt that when the direct communication with our great market is completed, the interior of the counties of Rockland and Orange will present a scene of activity and enterprise which will equal the most sanguine expectations. The revival of business has already had its effect upon the iron works now in operation, and it is not too much to predict that when the improvements recently introduced into the manufacture of iron shall have been perfected, this will become one of the great manufacturing districts of the State.

73. The following table will exhibit the composition of some of the iron ores recently analyzed.

No. 1.—A specimen of magnetic iron ore which I received as from Fort-Ann, in Washington county. The precise locality I am not acquainted with.

No. 2. Magnetic iron ore from the O'Neil mine, Orange county. Compact, of an iron black colour, is attracted by the magnet, and possesses polarity. In the seams of this ore, small, but very brilliant, octahedral crystals are found. Cubic crystals of the same ore have also been found here, but they are of very rare occurrence.

No. 3.—From the Rich iron mine, Monroe, Orange county. The specimen is remarkable for the ease with which it cleaves in the direction of the primary octahedron. The cleavages have a high metallic lustre. Colour, iron black; powerful action on the magnet. The silica is undoubtedly foreign.

No. 4.—This ore is cellular, apparently having contained sulphuret of iron, which has been dissolved out. It looks like a decomposed ore, although it is not only attracted by the magnet, but possesses polarity. It sometimes contains thin seams of asbestos. It is from the Forshee mine, in Monroe, Orange county—a most interesting deposit of iron ores.

No. 5.—From the Wilk's or Clove mine, Monroe, Orange county. It consists of grains of magnetic ore, of various sizes, closely united; with grains of iron pyrites intermixed. The ore is attracted by the magnet, but does not possess polarity, or only feebly. The specimen analyzed was as free as possible from pyrites. The ore requires roasting before it is used by the smelter.

No. 6.—Specular iron ore from the town of Hermon, St. Lawrence county. Made up of black shining scales, resembling graphite. Magnetic action very feeble, or none. Powder, red or purple. This specimen is very pure,—but the ore sometimes contains an admixture of sulphate of barytes, and occasionally of phosphate of lime. It is now worked without difficulty.

No. 7.—Limonite or brown hematite, from Dungen's mine, in Richmond county. Small rounded masses united together by a ferruginous cement, constituting what is commonly called *shot ore*. Powder, brown.

No. 8.—A specimen from a stratum of brown earthy hydrate of iron, known by the name of *umber*;—associated with magnetic iron ore, at the Forshee mine in Orange county. There are several different varieties of iron ore at this locality.

In addition to the above, two artificial compounds of iron deserve to be noticed. The one is the *graphitic iron*, containing variable proportions of graphite and iron, from a rejected hearthstone of the Southfield furnace, in Orange county: The other, a silicate of iron, in crystals, from the works of the Messrs. Pierson at Ramapo, Rockland county. The latter contains, according to the analysis of Dr. Fisher,—protoxide of iron 70, and silica 30, in 100 parts.

MANGANESE.

74. The ore of this metal which is most common is that which from its colour is called the black oxide of manganese. It generally has a brownish black or iron black colour, an earthy appearance, and it is usually mixed with other substances, as silica, alumina, oxide of iron, and carbonate of lime. It is often friable, easily reducible to powder, and strongly soils the fingers; sometimes, however, it has a fibrous texture, the fibres radiating from a common centre.

From recent researches it appears that the variety known by the name of *wad*, differs in containing a portion of water, and it has received the chemical name of hydrated peroxide of manganese, although the varieties of this oxide are indiscriminately applied to the same uses in the arts. These are in the preparation of chlorine for bleaching, and in the manufacture of glass.

My report of last year contained a notice of a locality of wad occurring on Tug Hill, in Lewis county. Prof. Mather, in his report for the same year, describes several important localities of the same substance in the counties of Columbia and Dutchess; and he asserts that 50,000 tons of wad could be procured in these counties without any great expense. If carefully prepared it would be worth \$20 a ton, or for the whole amount \$1,000,000.

75. The following table will exhibit the composition of such specimens of wad as I have been able to obtain.

	1.	2.	3.	4.	5.	6.
Peroxide of manganese,	68.50	58.50	50.50	53.00	33.40	11.45
Peroxide of iron,	16.75	22.00	24.50	32.15	34.10	28.20
Earthy matters, (silica and alumina,)	3.25	2.50	4.50	6.90	8.75	44.75
Water,	11.50	17.00	20.50	6.85	24.00	15.60
Copper, .....	.....	.....	.....	trace.		
	100.00	100.00	100.00	98.90	100.25	100.00

No. 1.—Specimen from the farm of Joseph Goodsell, two miles northwest of Hillsdale, Columbia county. Earthy, friable, of a blackish-brown colour.

No. 2.—From the farm of H. W. Gott, two miles west of Austerlitz, Columbia county. External characters similar to those of the preceding.

No. 3.—From the farm of David Parsons, three-quarters of a mile south of Canaan Centre, Columbia county. External characters similar to the former. The specific gravity of these is not above 3.

No. 4.—From Sing-Sing, in Westchester county. Colour blueish or brownish-black, compact. Specific gravity 4.33. Found only in small masses, in the Dolomite.

No. 5.—Found near Keeseville, in Essex county. Occurs in rounded masses, about the size of a pea, brown externally, and brownish-black in the centre; earthy, friable. It contains a large proportion of water and oxide of iron. Other specimens may be purer.

No. 6.—From Tug Hill, Lewis county. Colour jet black or brownish-black; earthy, friable. The only specimen I have at present, contains a very large proportion of impurities. Others will no doubt afford a greater amount of oxide of manganese.

LEAD.

In my report for 1837, I gave an account of the lead mines, which had previously been opened in the counties of Columbia, Lewis and St. Lawrence. During the past season, I have visited some interesting localities of the sulphuret of lead, with other accompanying minerals, in the counties of Sullivan and Ulster, of which I shall now give a brief description.

76. The principal deposit of lead ore, in the county of Sullivan, is situated near the summit of the Shawangunk mountains, two miles northwest of the village of Wurtzboro', and three-quarters of a mile from the Hudson and Delaware canal. This mine is situated in the millstone grit of which this mountain is composed, and the ore appears to be in a bed, alternating with the strata, although its inclination is somewhat different. At the place where the lead ore was first observed, a perpendicular shaft has been sunk about thirty-eight feet in depth. At the time of my visit, the miners were engaged in constructing horizontal drifts or levels to intersect the deposit of ore below the present shaft. The first level is about fifty-two feet below the opening of the shaft.

The second is about 127 feet below the same point. In both these drifts, the ore has been reached.

77. Three varieties of galena, or sulphuret of lead, have been found at this locality, viz: the common, in the form of laminated masses, and breaking into cubical or rectangular fragments; the granular, composed of granular concretions, resembling grains of steel; and the compact, having a close and compact texture, made up of very fine grains, with a somewhat conchoidal fracture, and little metallic lustre.

The galena, in all its varieties, is associated with the sulphurets of copper, zinc, and iron; the whole being disseminated in a matrix of quartz, which occasionally presents beautiful crystalline forms. At the lower level, above mentioned, the galena and blende are in nodules of various sizes in the quartz—the galena sometimes appearing as a central nucleus surrounded by the blende.

78. The pyritous copper, when recently broken, is of a golden yellow colour, but its surface usually presents the bluish-black tarnish which often characterizes this ore. Sometimes it occurs in the form of small, though perfect tetrahedral crystals which have a high lustre. Imperfect dodecahedrons are also occasionally found, and sometimes these are covered with a greenish coating, which is probably a carbonate of copper.

79. The sulphuret of zinc is brown and massive, being every where intimately intermixed with the lead ore. Indeed, they sometimes pass into each other, by almost imperceptible gradations. This fact is of considerable importance in estimating the value of this ore, for the mixture of the blende operates very injuriously in the process of smelting.

From this description, it appears that the associates of the galena at this locality, are similar to those of the same ore found at Ancram, in Columbia county. Indeed, some specimens from the two localities can scarcely be distinguished from each other. The rocks, however, in which these minerals are imbedded, are widely different.

80. At the Sullivan mine, the deposit of galena, be it bed or vein, is three or four feet in thickness, but to make up this, there is a large proportion of quartz, together with the other minerals already enumerated. Several tons of lead ore have been raised from the shaft and levels; an extensive smelting house has been erected on the banks of the Hudson and Delaware canal, and mining operations have been conducted during the greater part of the season, on a scale which could have been

warranted only by the most sanguine expectations concerning the quantity and quality of the ore.

Whether these expectations are to be realized, will soon be determined. In the mean time, without expressing a decided opinion in regard to the final result of the enterprise, I deem it proper to state, that the large admixture of foreign minerals, renders the reduction of the lead extremely difficult. The processes necessary to overcome this difficulty may be so expensive as to be ruinous, even although the ore should be found in sufficient abundance.

On the other hand, it should be observed, that the situation of this mine is very eligible. Fuel, for the smelting process, can be obtained in the vicinity at a cheap rate, and the product can at once, and with great ease, be sent to market.

There are some other deposits of lead ore in the vicinity of that just described, but they are entirely similar in their character and associations. They have not, however, been wrought to any extent, and their examination at present, can throw no light upon the question, whether lead ore exists in this county in sufficient abundance and of sufficient purity to sustain extensive mining and smelting operations.

81. The ore from the Sullivan mine is in many instances, perfectly pure. One specimen which I analyzed, was entirely free from foreign matters, containing about 86.50 pure lead in 100 of the ore; but most frequently there is a large admixture of quartz, zinc, iron and copper. On the suggestion of Prof. Mather, that this ore contained silver, I repeated his process, and obtained a minute globule of that metal. The proportion which it bears to the ore I have not yet had an opportunity of determining. By cupellation, I have also detected silver in the ore from Rossie, in St. Lawrence county. The occurrence of silver in the lead ores, is not uncommon, nor is it ordinarily a matter of much importance, as the proportion of that metal is usually so small, that it is not worth the expense of separating it. But a process has recently been made public, by which, according to the inventor, those leads which are too poor in silver to admit of being advantageously subjected to cupellation, as it is ordinarily practised, may, by repeated fusions and crystallizations, be rendered so rich in silver, that cupellation can then be profitably employed.* The subject is of great importance to those who are interested in the lead mines of St. Lawrence county.

* A detailed account of this process, with various statements, intended to show its importance to Great Britain, is contained in the abstract of the proceedings of the last meeting of the British Association for the Advancement of Science, published in the London Athenæum. It has been republished in the Family Magazine, and perhaps in other American periodicals.

82. The lead mines of Ulster county are situated in the same range of mountains which contain those of Sullivan; and only a few miles distant from the latter, mining operations have been conducted during the past year by the North American Coal and Mining Company. The principal mine is situated on the northwest face of the Shawangunk, about three-quarters of a mile from the Red Bridge, which forms the boundary between the counties of Ulster and Sullivan, on the Hudson and Delaware canal. The general character of the deposit of lead ore at this place is similar to that of the Sullivan mine, but in consequence, as it appeared to me, of some disturbance in the stratification, the rock and the bed of galena dip towards the north at a high angle. This, however, will hereafter be described by the geologist of the district. The mine has been worked by a perpendicular shaft, to which levels or drifts, passing into the mountain at different heights, are now constructing. The galena here, as at the Sullivan mine, is associated with copper pyrites and blende, in a gangue of quartz. The quartz often occurs in large and fine crystals;—these, however, are seldom doubly terminated, and are usually opaque.

At the time of my visit, the amount of lead ore obtained at this mine was quite inconsiderable, and it seemed to me that the prospect was far from being favorable to the proprietors. Perhaps, however, the mining operations were not then sufficiently advanced to enable me to form a correct opinion concerning the extent of this deposit of ore. But taking into consideration the nature of the rock in which the ore is found, the limited quantity of ore heretofore obtained, and the various foreign matters with which it is mixed, I more than doubt whether either of these mines will ever yield an amount of lead equal in value to the outlay which must be incurred in working them.

83. I have now examined and described, in my several annual reports, the principal deposits of lead ore which are at present known to exist in this State. A connected account of these will be introduced into the final work, with such additional information as may have been, in the mean time, obtained. It may be proper to add, that the lead mines of St. Lawrence county are the only ones which now give promise of successful exploration. The purity and abundance of the ore, and the ease with which it is reduced, all conspire to render these mines of the highest value and importance. No better evidence of the correctness of this assertion need be offered, than the fact that during the last year, (1838,) there were produced from the three mines in Rossie, 3,347,463

pounds of lead, which, estimated at five cents a pound, amounts to \$167,373.15.*

TITANIUM.

84. The metal titanium was discovered in 1791, but its properties were not satisfactorily determined until the year 1822, when Dr. Wollaston found it in a slag at the bottom of a large smelting furnace in Wales. It has since been found at several other iron works in Great Britain. Dr. Emmons obtained this metal from the hearth stone of an iron furnace in St. Lawrence county, and I have detected it also in the slag of the Greenwood's furnace in Orange county. It usually occurs in the form of cubic crystals, which in colour and lustre resemble burnished copper. In my specimen there is also associated with the metal a coating of a beautiful purple colour, which may be the oxide of titanium, supposed to exist only in the rare mineral called *anatase*.

85. There is another oxide of titanium, now more correctly termed titanic acid, which exists in variable proportions in several of the ores of iron, and from the decomposition of which, during the smelting of these ores, the metallic titanium is obtained. This substance closely resembles silica in many of its characters, and when in considerable proportion, it is supposed to have an injurious effect upon the quality of the ore with which it is associated. In its pure or nearly pure form, it is used for the purpose of giving a yellowish tint to artificial teeth, and in consequence of its comparative scarcity, and the difficulty of its separation from other substances, is sold at a high price.

Of the titanate of iron in the crystalline form, and now known by the name of Crichtonite, we have an interesting locality in Warwick, in Orange county, where it is imbedded in a dark coloured serpentine; and variable proportions of titanic acid are also contained in several of the iron ores of St. Lawrence, Jefferson and Orange counties.

ARSENIC.

86. Arsenical pyrites from which the compounds of arsenic used in the arts are obtained, has been found in this State, in the counties of Essex and Orange. In the former it is probably in considerable quantity.

87. There is a locality of arsenical minerals on the lands of Mr. B. Hopkins, near the village of Edenville, in Orange county, which is

* Report of the St. Lawrence rail-road committee, December, 1838.

particularly deserving of notice. I visited it in company with Dr. Horton during the last summer, and with some difficulty we succeeded in obtaining specimens of considerable interest to the mineralogist. These are, arsenical pyrites of a silver white colour, occurring in a vein in the white limestone, and which I found to be composed of arsenic, sulphur and iron. Associated with this is the arseniate of iron, or cube ore, as it is called from the primary form of its crystal, which here occurs as a coating, and possesses a beautiful green colour and an adamantine lustre. Every where investing the two preceding minerals is a powder of a lemon yellow colour, which is ascertained to be the sulphuret of arsenic or native orpiment. In another part of the same vein is found a considerable quantity of the red oxide of iron, which, together with the sulphuret of arsenic, has undoubtedly been produced by the decomposition of the arsenical pyrites. And in addition to these metallic minerals, we have also arragonite in delicately radiated fibres, and of a snow white colour, and occasionally thin laminæ of transparent sulphate of lime or selenite. On the whole, this is one of our most interesting localities, not only on account of the minerals which it affords, but of the apt illustration which it presents, of the changes produced in the mineral kingdom through the influence of chemical agencies.

I have thus given a general view of the Mineralogy of the State of New-York, chiefly in reference to its application to the arts. My object has been to excite an interest in this subject among the great body of our citizens, and to satisfy them of the utility of the work in which I am now engaged; and if I have been at all successful, I shall feel greatly encouraged in carrying forward these investigations to their final completion.

I have the honor to be,

Your obd't serv't,

LEWIS C. BECK.

January 26th, 1839.

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OF THE

REPORT ON THE MINERALOGICAL AND CHEMICAL DEPARTMENT OF THE SURVEY.

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SECOND ANNUAL REPORT

Of T. A. Conrad, on the Palæontological Department of the Survey.

The classification of the organic remains of New-York is approaching to a state sufficiently complete for an accurate grouping of the various strata. In Europe, the equivalents of the New-York formations are divided into two great systems, termed Cambrian and Silurian, which are unconformable to each other. The organic remains do not greatly differ in each, but they are far more rare and limited in number of species in the older, or Cambrian system (in this country,) except in the two overlying rocks, or the lowest of the Silurian system. Still in the fossils of the older division, we can recognize a character sufficiently marked and distinct, to enable us readily to classify the strata wherever we may find them in the most distant localities. The upper term of the Cambrian system may be recognized in the vertical and contorted slates and olive sandstones of the Hudson river, extending from Newburgh to Glen's Falls.

Organic remains, other than obscure *Fucoids*, are very rare, except in particular localities, where *Fucoides serra*, of Brongniart, abounds, and is very characteristic from its numbers, for in the Silurian rocks it is almost unknown. Several other species of the genus to which the *serra* belongs, have also been found in the same localities. The *F. dentatus* Brong. also occurs, but is not nearly so numerous as in the Silurian slates. This species has been referred to *Graptolites* Linn, and is supposed to bear no analogy to marine plants; indeed, all the members of the group are very unlike the true *fucoids* of the Transition. These are nearly all the organic remains which occur in the slates, but fragments of the trilobite, *Cryptolithus tersellatus* have been very rarely found, a species common in the Trenton limestone at Fonda, on the Mohawk, and at Glen's Falls. Over the highly inclined strata of the

Cambrian or Hudson system, rest in a nearly horizontal position the Silurian strata, with the limestones and slates of which series commenced the first condition of the seas, favorable to the existence of myriads of shells, corals, and trilobites, whose exuviae have very materially added to the thickness of the strata.

In the report of the geologist of Pennsylvania, the olive sandstone of the Cambrian or Hudson strata, has been confounded with the fourth rock of the Silurian system, known by the name of Salmon river sandstone, which formation is admirably characterized in New-York, Pennsylvania and Ohio, by the *Pterinea carinata* of Goldfuss.

There is strange misunderstanding of the method of applying organic remains in the division of series of strata into formations, and the identification of widely separated rocks by the Zoological characters of each. In the January number of the New-York Review, the opinion is advanced, that the "*Calymene Blumenbachii* ought to be carefully sought for in the rocks which are said to correspond to the Dudley period. Unless it is found, or some other consideration is introduced, can it be believed that fossils are a satisfactory evidence of the age and place of rocks?" The line of demarkation between rocks of different age has never yet been drawn with any accuracy by the aid of Palæontology, except by the consideration of groups of species, one, or even a few species, having no weight whatever in the determination. Thus the shell termed *Terebratula Schlotheimii*, dates its existence with the Trenton limestone, and reappears in three of the latter formations of the Silurian system. *Orthis testudenaria*, Dalm. is peculiarly characteristic of the Trenton limestone, by its almost invariable presence and extreme abundance, and yet it is also found in the limestone of the Helderberg a formation of a far more recent origin. But, although a few species may have been continued through a succession of geological eras, the groups are widely distinct, and their value in determining the comparative age and identity of formations, can never again be called in question by a geologist who deserves the name.

Excepting two trilobites, I have always found the organic remains of the Dudley limestone to correspond with those of rocks far above the Trenton limestone, and therefore it was natural to suppose that the *Calymene Blumenbachii* had escaped from the catastrophe in remote seas, which destroyed it here. But that trilobite has lately been found in the Rochester shale, in company with *Asaphus caudatus*; in this place it occupies the same position in the scale of formations which it holds at

Dudley, above the Trenton limestone, but in this country it is characteristic only of the latter formation, for there it abounds, whilst in the Rochester shales it is very rare. Occasionally the relative position of two formations may be so obscured, or the mineral character so similar, that the amount of difference will not be always estimated by those who describe them. It is just so in Ohio and Kentucky, where no observer has yet drawn the line of distinction between the Trenton and the newer limestone superimposed upon it, because the similarity in mineral character and color is so perfect, and the formations thin out into mere seams and layers, that a critical knowledge of the fossils is necessary to determine the difference in age. It is possible, therefore, the *Calymene Blumenbachii* and *Asaphus tuberculatus* are most abundant in a limestone at the base of the Dudley series, which corresponds in age, not only with the Trenton limestone, but also with the Llandeile flags of Murchison, whose observations, when published more in detail than they have yet been given to the world, will probably clear up all this difficulty.

The catalogues of organic remains of the Silurian system, hitherto published in Europe, are only calculated to mislead and confound the geological enquirer, as they are far too vague; not only the species peculiar to certain formations being indiscriminately mingled, but even the groups of the Silurian and Carboniferous systems are strangely confounded. This is the case in "De la Bache's manual," "Thomson's outlines of Geology," Phillips' Treatise on Geology in the Encyclopedia Metropolitana, and in the Lethea Geognostica of Bronn. The last named author has published a plate of numerous species of organic remains as characteristic of the mountain limestone, among which it is difficult to detect one belonging to that system, for they are nearly all characteristic of the Silurian strata. There are also important errors in his figures, such as the round perforation in the beak of *Atrypa prisca*, an imperforate shell. Excepting *Lingula*, no bivalve with a *perforated apex* occurs either in the Silurian or Carboniferous systems. The genus *Terabratala* is wholly unknown, and the shells usually referred to that genus I propose to group under the generic name of *Stenosisma*, derived from two Greek words signifying narrow fissure, a character these shells possess under the imperforate apex of the larger valve, and which serves to connect the genus with *Delthyris*, from which it differs in having no cardinal area. This last named character on the other hand connects it with the genus *Strygocephalus*. I refer to it the common Silurian bivalve, *Terebratala Schlotheimii*, (Von Buch.) The genus *Producta* of Sowerby is unknown in all the rocks of the Silurian sys-

tem, except in the highest or the Ludlow strata, where two species occur; here on the contrary, the genus *Strophomena* of Rafinisque is unknown, as well as in the Carboniferous system, whilst it abounds in the Helderberg and Trenton limestones. The following table will show some of the characteristic genera of the two systems and subdivisions.

SILURIAN SYSTEM.		CARBONIFEROUS SYSTEM.
<i>Brachiopoda.</i>		<i>Brachiopoda.</i>
Strophomena, (lower and medial strata.)		Producta.
<i>Crustacea.</i>		<i>Crustacea.</i>
Dipleura, } Eurypterus, }	(upper strata.)	Very rare, and the genera undetermined.
Platynotus, } Trimerus, }	(medial strata.)	Polyparia?
Isotelus, } Triarthrus, } Ceraurus, }	(lower strata.)	Amplexus.
<i>Polyparia.</i>		
Catenipora, (medial strata.)		

Among the curious and interesting organic remains of the Transition, the fucoids are not the least worthy of notice, and they seem to have been much neglected by naturalists. They are even more characteristic than the testacea, so far as the species have been determined, for particular species are more absolutely limited to the respective rocks in which they originated. They assume a variety of forms, no doubt corresponding to various as yet undetermined genera. Some of them have been of a fibrous reticulated structure, having vesicular appendages, often lobed and imitating on the sandstones the forms of tracks of reptiles and birds which some writers have believed them to be. On plate 26, in Buckland's Bridgewater treatise, these foot shaped vesicular fucoids may be seen attached to the net-work, and no doubt they performed the office of floats to support the fibrous structure to which they were appended. Some naturalists have doubted the vegetable origin of these singular remains, but they could neither have been polyps nor radiated animals, since no trace of organic structure other than the mere general form is ever exhibited. Besides, like the Fuci, they were very partial to a sandy bottom, being comparatively rare in limestones, whilst the corals and radiated animals are chiefly found in the latter. *Fucoides Harlani* is extremely abundant in the red shales of Medina and Rochester, and in the equivalent sandstones and shales of Pennsyl-

vania and Virginia, and is more generally known than any other species. It is absolutely limited to this peculiar formation, serving to identify it in every locality. It appears to have formed a net-work, like the Dictuolites, but terminating in some of its ramifications unlike the latter, in fasciculi, somewhat resembling the human fingers. It is very difficult to ascertain with certainty whether the branches really anastomose, but such is the opinion derived from a careful examination of some very perfect specimens.

It is doubtful whether a more perfect series of Transition strata than that of New-York can be found in any part of the world, and certainly no group or system is more perfectly characterized by peculiar forms of organic remains. Nine distinct groups occur within the limits of the State, all below the great coal formation and Carboniferous or mountain limestone strata, which lie in the bordering counties of Pennsylvania. To show the order of superposition of some of the transition rocks, and the distinctive nature of the organic remains, I have drawn up the following table, chiefly from observations made during the first year of the survey, and confirmed by subsequent examinations.

Table of formations, showing the order of superposition, and some characteristic fossils of the Transition strata.

10. Carboniferous strata, (in Pennsylvania),..... { Euomphalus catillus; Delthyris trigonalis, D. cuspidatus, Producta sco-
tica, P. sulcata, P. scabricula, P. hemispherica, Goniatites minuta,
G. Henslowi, calamopora polymorpha, Amplexus coralloides.

ROCKS OF NEW-YORK.

OLD RED SANDSTONE GROUP, (*Murchison.*)

Old Red Sandstone?

9. { Olive sandstone, (organic remains undetermined,
except a few land plants, very rare.)

8. { Dark coloured shales,..... { Dipleura Dekayi, Cryphæus Boothii, Calymene Rowi, Pterinea fascicu-
lata, P. concentrica, Posidonia lirata, Delthyris distans, (Sow.) Lima
macroptera, Cyrtoceras maximum.
Black slate,..... Posidonia.

MEDIAL SILURIAN STRATA.

- { Gray Brachiopodous sandstone,..... Atrypa elongata, Delthyris arenosa.

- { Helderberg sandstones,..... Fucoides cauda-galli.

7. { Asaphus micurus, A. selenurus, Calymene bufo, Cryphæus calliteles,
Calymene anchiops, Atrypa prisca, A. aspera, A. Wilsoni, Pileop-
sis tubifer, Strophomena rugosa, S. tuberulifera, Atrypa concentrica,
Calamopora fibrosa, Cyathophyllum ceratites, C. helianthoides.

- { Second Pentamerus limestone,..... Pentamerus Knightii, Euomphalus profundus.

- { Gypseous shales, } Eurypterus remipes.
 { Rochester shales, } Asaphus caudatus, Platynotus Boltoni, Trimerus delphinocephalus, Orthis elegans, strophomena elliptica, Delthyris lineatus, Caryocinus loricatus, C. ornatus.
 { Pentamerus limestone, } Pentamerus elongatus, (P. oblongus?)
 { Green slate, lenticular iron ore, &c. } Undetermined.
 { Niagara sandstone, (red), } Fucoides Harlani, Dictuolites Beckii, Lingula cuneata.
- LOWER SILURIAN STRATA.
- { Salmon river sandstone, (olive), } Pterinea carinata, (Gold.) P. planulata, P. modiolaris, Cyrtolites ornatus.
 { * Green slate, } Agnostis pisiformis.
 { Gray crinoidal limestone, } Group of the Trenton limestone.
 { Trenton limestone and slate, } Cryptolithus tessellatus, Triarthrus, Asaphus tuberculatus, Calymene Blumenbachii, Isotelus, Ceraurus, Orthis testudinaria, strophomena alternata, Pleuromaria cirriformis, Orthoceras striatum, Trocholites ammonius, Columnaria sulcata, Trianisites, Fucoides dentatus, (Graptolites.)
 { Mohawk limestone, } Orthostoma communis.
 { Gray limestone with sparry veins, } Fucoides demissus.
 { Gray calcareous sandstone, } Lingula acuminata.
- CAMBRIAN SYSTEM, (Sedgwick.)
- { Olive sandstone and slate, } Fucoides serra, (Brong.)
 { Variegated sandstone, (Potsdam sandstone of Emmons,) } Dictuolites radians.
- Primary.
- Gneiss, &c.

* The position of this rock with Agnostus was determined by Mr. Vanuxem.

Descriptions of new species of organic remains.

STROPHOMENA, Raf.

1. *S. elliptica*. Shell elliptical; inferior valve ventricose, gibbous in the middle, radiating striæ acute, remote; umbo elevated, ventricose, summit rounded; beak much incurved; superior valve striated; lateral extremities angulated, prominent. Length, $\frac{3}{4}$ inch. *Locality*, Rochester, in formation No. 6. See table.

2. *S. deltoidea*. Shell deltoid, with numerous radiating striæ and concentric rugose undulations, obsolete on the inferior half of the valves; inferior valve slightly convex above, gibbous, abruptly rounded and flattened at the base; striæ small and crowded; one or two lines in the middle of the valve larger and more prominent than the others; angles of the cardinal line slightly prominent. Length, 1 inch. *Locality*, Trenton-Falls.

3. *S. lineata*. Shell suboval, length greater than the height, inferior valve convex; lateral margins rounded, and forming, with the basal margin, a nearly regular arch. Length, $\frac{5}{8}$ inch. *Locality*, Cayuga lake.

4. *S. carinata*. Shell suborbicular, with from 16 to 18 angular radiating ribs; superior valve with a sinus in the middle; inferior valve angulated in the middle, slightly flattened on the sides; base prominent and subangulated in the middle; basal margin sinuous. Length, $\frac{3}{4}$ inch. *Localities*, Helderberg mountain, in limestone; Ludlowville.

5. *S. modesta*. Shell alated, compressed, with obsolete radiating striæ; inferior valve slightly convex; extremities of the cardinal line acutely angulated; within punctate. Length, $\frac{1}{2}$ inch. *Locality*, Rochester, Mr. Hall.

Lingula.

1. *L. cuneata*. Shell cuneiform; lateral margins subrectilinear; beaks acute; valves convex towards the apex, flattened on the inferior half; base slightly arcuate. Length, $\frac{1}{2}$ inch. *Locality*, Medina, Orleans co.

2. *L. acuminata*. Shell acute, acuminate at the apex; somewhat gibbous on the umbo and compressed laterally; basal margin rounded. Length, $\frac{1}{2}$ inch. *Locality*, uncertain; in "calciferous sand rock."

3. *L. concentrica*. Shell ovate-acute, with very regular numerous concentric raised striæ; lateral margins subrectilinear in the middle. Length, $\frac{1}{2}$ inch. *Locality*, Helderberg mountain, in limestone.

4. *L. oblonga*.—Shell oblong, sides nearly straight and parallel, regularly arcuated above, and abruptly rounded at base. Length, $\frac{3}{4}$ inch. *Locality*, Martville, Cayuga county, in sandstone.

ATRYPA.

A. elongata. Shell narrow elliptical, with numerous radiating striæ; lateral margins truncated in the middle; inferior valve gibbous in the middle, and somewhat depressed on the sides. Length, 3 inches. *Locality*, Helderberg, in sandstone.

DELTHYRIS.

1. *D. acuminata*. Shell subcordate, dilated transversely; valves with radiating sulci; superior valve, very prominent and carinated in the middle, carina not sulcated, slightly arcuate in length; lateral extremities rounded; base emarginate; inferior valve profoundly bilobed, sulci not deeply impressed; beaks approximate. Length $2\frac{1}{4}$ inches. *Locality*, Helderberg, in limestone. It resembles *Atrypa acuminata*, (Sow.)

2. *D. granulosa*. Shell trigonal, ventricose, with very numerous minute elevated punctæ; ribs numerous, convex, the interstices not deeply impressed; inferior valve bilobed; beak elevated, incurved, foramen large; superior valve with a wide medial convex depressed rib, with a narrow groove down the middle; umbo prominent, summit rounded. Length $1\frac{1}{2}$ inches. *Locality*: uncertain, but belongs to the shales of No. 7.

3. *D. arenosa*. Shell trigonal, with radiating sulci; superior valve with a rounded elevation in the middle, having about 4 sulci upon it, or 5 ribs; inferior valve, with a corresponding furrow; basal margin undulated, prominent and angulated in the middle. Length $2\frac{1}{4}$ inches. *Locality*, Helderberg, in sandstone.

Fresh Water Shells.

CYCLOSTOMA.

C. pervetusta. Shell orbiculato-conical; volutions 3 or 4; base with a profound umbilicus, exhibiting the volutions to the apex. Length $\frac{3}{4}$ inch.

PLANORBIS.

P. trilobatus. Shell orbicular, with three nearly equal rounded prominent lobes; the large volution rapidly enlarging towards the aperture. Length $\frac{1}{4}$ inch.

UNIO.

1. *U. primigenius*. Shell ovate, ventricose; anterior side narrowed, sinuous or contracted; posterior side profoundly dilated; dorsal margin elevated, rectilinear, subalated, beaks prominent, acute; posterior extremity rounded; cardinal teeth compressed, very oblique; lateral teeth lamellar, rectilinear. Length $1\frac{1}{4}$ inch.

2. *U. orthonotus*. Shell oblongo-ovate, slightly furrowed or contracted obliquely from beak to base; anterior side very short; posterior side elongated; dorsal margin rectilinear and declining; umbonial slope angulated; basal margin straight; cardinal teeth oblique. Length 1 inch.

These fresh water shells occur in the red sandstone at Medina, beneath the layers of *Fucoides Harlani*, the *Unios* and *Planorbis* not very common, but the *cyclostoma* in great abundance.

CRUSTACEA.

CRYPHÆUS, Green.

C. greenii. Body tail with the margin rather obtusely rounded; surface granulated; lobes obtuse or truncated at the extremity, end of the middle lobe somewhat expanded; groove on the ribs short and terminating abruptly in an angle.

Observations. When the crust of this trilobite is removed it exhibits very narrow prominent articulations, and no sudden depression at the termination of the ribs which is so marked a characteristic in the callitedes. I have named it in honor of Professor Green to whom we are indebted for the name and illustration of the genus. *Locality*. Moravia Cayuga county, in shale with *Dipleura*.

CALYMENE.

C. marginalis. Buckler with a broad margin; eyes large, semi-oval; middle lobe entire, convex, smooth, abdomen

Locality, near Ithaca, in a boulder. This has a much less prominent front than the Rowi, a deeper groove between the eye and middle lobe, and the tubercle which nearly joins the lower angle of the eye is much smaller.

T. A. CONRAD, *Palæontologist*.

Frankfort, Jan. 23, 1839.

To His Excellency W. H. SEWARD,
Governor of New-York.

SIR:—

I have the honor to enclose herewith my report on the First Geological District of New-York. It contains my report on the economical geology of New-York, Westchester, Putnam, Rockland and Orange counties, marked (A,) and an appendix in two parts marked (B) and (C.)

The document marked (B,) is on the descriptive geology of Orange county, by Dr. Horton; the other, marked (C,) is on that of New-York county, by Dr. Gale.

I have the honor to be,

Sir, your ob't serv't,

W. W. MATHER,
Geologist First District, New-York.

THIRD ANNUAL REPORT

Of W. W. Mather, Geologist of the First Geological District of the State of New-York.

To His Excellency WILLIAM H. SEWARD,
Governor of the State of New-York.

SIR:—

As an introduction it may not be improper to state what progress has been made thus far in the Geological Survey of the First District of New-York.

During the first season, viz. in 1836, I completed the reconnoissance of the first district, and made the detailed surveys of Suffolk county, the economical results of which may be found in the first annual report. Assembly document No. 9, pp. 61, 96, 1836.

The second season was devoted to the detailed surveys of Queens, Kings, Richmond, Dutchess and Columbia counties. The economical results may be found in the second annual report, pp. 121, 184, Assembly document No. 200, 1838.

The third season, or 1838, has been devoted to investigating the geology of New-York, Westchester, Putnam, Rockland and Orange counties, the economical results of which will be found in the present report.

The *details* of geology that are not of *direct* practical utility, have been retained, with a view to their publication in the final report of the survey, since the sole object in making the annual reports, is to enable the people to profit by the discoveries made, while the survey is still in progress.

In addition to the geological investigations, a large collection of specimens has been made to illustrate the geology and mineralogy of those counties that have been examined. Specimens, corresponding nearly

with the numbers given below, have been collected from the several counties, viz:

Suffolk, about	800
Queens, }	
Kings, }	450
Richmond, }	
New-York, say	400*
Westchester,	712
Putnam,	423
Dutchess, }	
Columbia, }	1,352
Rockland,	465
Orange,	3,029
	<hr/>
	7,631 specimens.
	<hr/>

About one-third of this number has been collected for the geologists of the different districts, and mineralogist, so as to give to each a suite to illustrate the geology of the first district, leaving about 5,088 specimens, which are deposited in the State cases in the Geological Rooms of the first geological district. These cases are in the room over the State Library, (Miscellaneous Library.) They are all labelled and arranged in eight distinct sets. One of these sets is displayed in the glass show cases, while the seven duplicate sets are contained in seven horizontal layers of drawers, and placed in the same relative order of position as those in the show cases above.

The manuscript geological notes of my surveys in the form of a diary, are bound into nine duodecimo volumes of 400 to 700 pages each, each of which has a table of contents, and an alphabetical index to facilitate reference.

I have made topographical maps of Columbia and Dutchess counties, and partly completed the drawings of those of Putnam, Westchester, Rockland and Orange. Topographical maps had been published of the counties of Suffolk, Queens, Kings, Richmond and New-York, which rendered this labor for those counties unnecessary. Numerous local maps, diagrams, sections, &c. &c. are contained in the volumes of the diary.

* The specimens from the island of New-York have not been received and placed in the cases, but it is supposed that there are about 400. Feb. 4, 1839. The New-York specimens are now in the cases. W. Horton.

During the next season it is my intention to make the detailed surveys of Ulster, Delaware, Greene, Schoharie and Schenectady counties.

This intimation of what counties it is contemplated to examine during the next season, is given at this time, in order that persons owning property in those counties and wishing examinations made, may give notice in due season. Letters, *post paid*, addressed to W. W. Mather, Geologist of the First District, Albany, and requesting him to examine the mineral resources of property in those counties, will be attended to in the course of the season.

In discussing the geology of the counties examined during the past year, we will consider first, that of New-York, Westchester and Putnam, and afterwards, that of Rockland and Orange counties.

The general geological features of these groups of counties, except the ranges of mountains called the Highlands, are widely different. Although I have spent twelve years of my life in the midst of the region explored the past season, and although in the habit of spending most of my leisure during that time in unravelling its complicated geological phenomena, I feel that I have but *begun* to develop those facts that are of high importance, not only in scientific, but in economical geology. The general geology is very simple, but when we come to examine particular strata, veins and beds of useful minerals, and trace out the connection of the different localities, it is found to require much time and an intimate practical knowledge of the subject. The strata, in many places, are transverse to the general direction of the strike of the rocks, in consequence of transverse upheaves, of which there are several striking examples. Again, faults are numerous, and in many of these the heaves are not only vertical but lateral, and sometimes to a distance of 1,000 to 6,000 feet. These counties present one of the finest fields in our country for the investigations of physical geology. A life-time might be well spent, and with advantage to the community from its economical results alone, in developing the geology of the counties explored this season. The time for the completion of the survey is so limited, that to do equal justice to all the counties, superficial and slight examinations only can be made. These, however, have been sufficient to develop a vast amount of mineral treasures that were unknown before or not appreciated.

New-York, Westchester and Putnam Counties.

General Remarks.

In their topographical character, these counties are hilly, with broken rocky ridges on the western side, while the aspect of the eastern is that of heavy undulating swells of land. The soil is derived from the disintegration of the contiguous rocks, and from the pebbles and boulders of materials transported from a greater or less distance from the NNW, by some natural cause. The soils resulting from such a variety of rocks, contain all the *mineral* elements of fertility, while the careful husbandman supplies artificially those *organic* elements which are necessary as food for plants.

Nature has deposited almost inexhaustible quantities of manure in the bog meadows of the interior, in the salt marshes along the coast, in the mud flats of the river, and in the limestone hills; while on the other hand, great quantities are annually taken from the city of New-York, and distributed over the country. This feeding of the soil, if it may be so termed, is as necessary to its productiveness as feeding our cattle and horses, if we would have them efficient. The mineral manures, as lime, gypsum, bone earth, &c. are the seasoning, while the animal and vegetable matter supplied to the soil are the proper food for the growth of plants.*

ECONOMICAL GEOLOGY OF NEW-YORK, WESTCHESTER, AND PUTNAM COUNTIES.

Fluviatile or River Alluvions.

These alluvions in the district under consideration are not extensive. The streams flow through a rocky region, from which there is little wash. The waters are limpid and pure, and little sediment is deposited from them, even in time of floods or freshets. There are no alluvions of this class of considerable extent in those counties that might not be classed with salt marshes. The Hudson river to Albany may be considered an estuary, in which the tide ebbs and flows, and the water is always brackish to the Highlands, and frequently as far as Poughkeepsie and Hudson. The most important of the fluviatile alluvions in the

* Prof. Hitchcock, in his report of last year to the Legislature of Massachusetts on the geological re-survey of that State, has made many valuable and judicious remarks upon agriculture, upon soils and manures, and the office that these latter perform in supplying food to plants. The investigations of Prof. Hitchcock and Dana are considered the most important that have been brought before the public for a long time. They give a new aspect to agriculture as a science, and many facts that have been long known to intelligent and observing farmers, are there explained on philosophical principles. I would earnestly recommend that every farmer should peruse that part of Prof. Hitchcock's report of the geological re-survey of Massachusetts in 1838, which refers to agriculture, soils and manures.

Hudson in the counties under consideration, are the silt and mud banks forming in Tappan bay between Sing-Sing and Dobbs' ferry; the meadows near Gen. Van Cortland, at the mouth of the Croton river; the mud and silt banks extending from the above mentioned meadows to Teller's Point on one side and Sing-Sing on the other, and which occupy most of the bay between Teller's Point and Sing-Sing; the flats in Haverstraw bay between Teller's point and Verplanck; the meadows east of Verplanck; the flats between Verplanck and Royd Hook in Peekskill Bay; the meadows between Anthony's Nose and Marble Point, and the meadows and flats that lie SE, E, NE and N of Constitution Island, below Cold Springs. The last meadow is the only one that has been dyked out to prevent its being overflowed by the tides. Two or three hundred acres are enclosed, and good hay is produced upon these meadows. The meadow east of Verplanck may be said to be dyked out. A fine road has been built across the marsh near its south end within the last two years, and the tide may now be excluded. The amount of drainage water flowing into it is very trifling.

This meadow is filled with peat to a great depth. While the road was in progress of construction across this quaking bog, the weight of gravel was so great as to cause the turf to yield, and the road sunk, while a mass of peat was forced up on each side, rising above the general level of the marsh. Several thousand loads of gravel were necessary to fill the small portion of the road way that sunk, and it was estimated that the depth of the peat must have been about 40 feet. The peat seen at this place, and which had been raised above the surface by the sinking of the road-way, was of inferior quality, coarse and fibrous, but that which is good may be below. This marsh is so convenient to water transport, that the peat may be considered valuable.

Peat is probably abundant in the meadows near Constitution Island, though it has not been particularly examined.

The mud flats that have been mentioned in Tappan Bay, Haverstraw Bay, Peekskill Bay, and near Constitution Island, are all increasing slowly, and from a variety of causes, such as vegetable decomposition, the silt and mud deposited from the water, and the growth and decay of molluscous and other animals. They have increased more rapidly during the last twenty years than before, in consequence of the greater amount of cultivated land causing a greater amount of earthy materials to be transported by the rains and surface waters into the Hudson. These flats will eventually become meadows, but the time may be far distant. Should land continue to increase in value near the Hudson as

it has for a few years past, it may become an object to dyke out several of these flats, and thus redeem some thousand acres. They are at present unproductive, except raising some oysters between Sing-Sing and Dobbs' Ferry. Oysters might probably be much more largely cultivated in the Hudson than they have been. On Long-Island, Staten-Island, and in New-Jersey, it is made a profitable business.

Salt Marshes.

The salt marshes, and the fluvial alluvions of the Hudson river, in the counties of New-York, Westchester and Putnam, which may be classed as incipient salt marshes, have already been considered. The salt marshes of New-York and Westchester counties, on the coast, were alluded to in the Second Annual Report on the Geology of the First District, pp. 123, 125. The area of these marshes on the southeast coast of Westchester county, was estimated at 9-square miles, or 5,760 acres. The marshes of New-York county are described in the report of Prof. Gale, on the description of geology in that county, which will be found in the *appendix* to this report. The same remarks might be made on these marshes as to their origin, present and future uses, as were made on those described in the last year's report on Long and Staten-Islands.*

They may be made highly productive lands for tillage; they contain inexhaustible supplies of manure; many of them contain an abundance of peat, which may be used as fuel, or for making carbonate of soda; and the marshes may also be used for salt works where a large surface may be exposed either to solar evaporation, or to the frosts of winter, to concentrate the sea water and prepare it for crystallization.

Peat.

This combustible alluvion is not uncommon in the counties under consideration; but it is not so abundant as in Columbia, Dutchess and Orange counties. It is now coming into use as a fuel, and must, before many years, be extensively employed for this purpose in this part of the country, where coal and wood are so expensive. The manure peat of the salt marshes has already been alluded to. It may be estimated that there are 5 square miles of manure peat in the salt marshes of Westchester, or 3,200 acres, which will yield upon an average 1,000 cords of peat of the second quality to the acre, or in round numbers, 3,200,000 cords. The marshes of the Hudson river in New-York, Westchester and Putnam counties, that will yield peat, may be estimated at 1,000 acres, with a yield of 2,000 cords per acre, or 2,000,000

* *Second Annual Report on the Geology of the First District of New-York*, page 124.

cords. These include those near Sing-Sing, Verplanck, Peeksville, Anthony's Nose, Constitution Island, and numerous smaller ones. The peat in most of these marshes where it was examined, is of inferior quality, fibrous, and contains much earthy matter. That formed in marshes in the interior of those counties is of much better quality, and far superior as an article of fuel. The following are the most valuable localities observed, though there may be many others of equal or greater importance. The rapidity with which it is necessary to traverse the country in order to complete the survey in the time authorized by law, renders it impossible to devote as much time and attention to local examinations as their importance, or the expectations of the people require. The geological survey, valuable as its results have already proved, can be called only a careful reconnoissance.

Peat.—Local Details.

	Cords.
On Joshua Raymond's farm, one-fourth of a mile west of Bedford, in Westchester county, Prof. Cassel's reports that there is a peat bog of 60 acres,.....	60,000
Also on Abraham Underhill's farm, two and a half miles south of Crum Pond village, Westchester county, Prof. C. reports that there is a peat bog of 50 acres, averaging 20 feet in depth, and containing about.....	183,000
There was said to be a peat bog of 150 acres east of Croton, and about four miles southeast of Sumerstown Plains,.....	150,00
A peat bog of 30 or 40 acres lies near the east side of Mahopack pond in Putnam county,.....	40,000
A large peat bog was observed near Patterson, Putnam county, and it probably contains.....	500,000
A peat bog of 6 or 8 acres was observed in Phillipston, on the Phillips estate, about two miles ENE of West Point,	10,000
Another on the same estate about eight miles from Cold Springs, on the turnpike road to Putnam C. H. may contain from 10 to 20 acres,	20,000
Another on the road from Putnam C. H. to Patterson, in Putnam county, containing about.....	20,000
Another four miles southeast of Pecksville, of 6 or 8 acres,	13,000
Another about one mile south of Scrub-Oak Plains, Westchester county, say	10,000
Carried forward,.....	

	Cords.
Brought forward,.....	
Another east of Stewart's iron mine at the base of the hill,	20,000
Another half a mile south of do. in Phillipston,.....	10,000
Another near Davenport's corners, five miles northeast of Cold-Springs,	100,000
Another half a mile west of Saxon Smith's, in the SSE part of Phillipston,	25,000
	<hr/>
	1,161,000
	<hr/> <hr/>

Marl.

This alluvion, although sought with care, was not found in New-York, Westchester or Putnam counties. It seems to be confined to the slate and graywacke regions of the First Geological District, as far as we can judge from the observations made thus far on the Geological Survey.

Terrains de Transport.

This, as a descriptive term, is meant to include all those materials which, as a mantle, cover the proper rock formations over a considerable area in the counties under consideration.

They bear undoubted evidences of having been transported by, and deposited from water. They are found as gravel and pebble beds, boulders and erratic blocks, and as sand and clay beds, in the main valleys of the streams. They are all of high scientific interest; but in the present report only those of economical value will be discussed.

Clays and Sands.

These materials form numerous and extensive beds along the banks of the Hudson, varying in elevation from the level of the river to a height of near 100 feet. The general order of superposition where all the beds occur, is as follows:

1. Gravel and pebble beds of variable thickness.
2. Sands stratified with water lines oblique to the strata.
3. Gray or yellowish clay.
4. Blue clay.

The blue clay generally rests on the subjacent rock, or on beds of gravel. The sand is extensively used for brick making, for lime-mortar, for casting sand and for moulding sand, and in brick making. Materials suitable for this purpose are found in many places, but the brick

yards generally supply themselves from localities long used. The price paid for moulding sand is, in some places, 25 cents per bushel, so that a bank of it is of great value. It is composed of grains of quartz with some of feldspar, garnet, hornblende and magnetic oxide of iron. The water lines oblique to the strata, indicate the directions of the currents that deposited the beds and strata of this material. Near our cities and large towns, where much sand is required for mortar, the sand and gravel beds of this formation are of great value, and their proprietors realize a large amount per acre for materials that are usually considered almost worthless.

CLAYS.

Both the blue and gray clays are plastic and are used in the manufacture of bricks, stone ware and coarse pottery. Both these clays contain carbonate of lime, and they may without impropriety, be called marly clays, and are well adapted for use on light soils.

They will not only improve the texture of such soils, but they will supply some mineral substances which are necessary for the production of certain crops. They have already been used to some extent on such soils with advantage, and it is believed that they may be made more extensively useful as a mineral manure. The uses of these clays for stone ware and pottery, are scarcely worth mentioning as statistical facts, as the amount of industry, capital and production is so limited.

It is different with the brick manufacture, which employs a great amount of industry and capital. The gross number of bricks made in the counties under consideration, may be estimated at 42,900,000 per annum, with a value of \$225,225, as the average sale prices at the kiln is about \$5 to \$5.50 per thousand.

LOCAL DETAILS OF THE BRICK MANUFACTURE.

There are three brick yards in Dutchess county, that ought to have been mentioned in the geological report of last year, but were omitted through mistake. One is located near Break-neck Hill, and two others are in operation near the mouth of Fish Kill creek. They make about 5,000,000 of bricks per annum. The estimated number of last year makes an aggregate of 17,000,000.

In Putnam county bricks are made as follows:

At the yard near Break neck Hill,	2,000,000
“ “ at the foot of Bull Hill,	1,200,000
	<u>3,200,000</u>

In Westchester county,

At Carpenter's yard below Peekskill,.....	7,000,000
“ the four yards east of Verplanck's,	5,000,000
“ H. I. Crugher's yard, southeast of Verplanck's,	500,000
“ Jesse Wood's yard, 2 miles above Teller's Point,	6,000,000
“ Anderson's, “ “ “	2,000,000
“ Frost & Doty's, “ “ “	5,000,000
“ Wager & Hull's, half “ “ “	2,000,000
“ Hull's, “ “ “ “	1,500,000
“ Yard on Teller's Point,.....	1,500,000
“ James and Samuel Wood's yard at Tarrytown,.....	5,500,000
“ Appleton's yard, 3 miles below Sing Sing,	500,000
“ Daniel C. Hardin's yard at Sparta,.....	1,200,000
“ Charles Smith's “ Sing-Sing,.....	500,000
“ Stephen Ford's yard, one mile above “	500,000

Total amount of bricks made in Westchester county,.. 38,700,000

There are several small brick yards that burn bricks occasionally, that have not been taken into account, but it is believed that all those making a regular business for shipments to New York and other places, have been mentioned. We may estimate the annual product of the clay beds in Putnam, Westchester and New-York counties, at 42,900,000 of bricks, which, at the average price of \$5.50 per thousand, gives an income of \$235,950 per annum.

The brick yard at Tarrytown has been in operation about 40 years, and was established by James Wood, the father of the present proprietors. He is said to have invented and patented the improvement in burning bricks by the use of anthracite. Five tons of the dust of anthracite coal is mixed with the clay for 100,000 bricks. For 450,000, which is about the usual size of the brick kilns, 22½ tons of coal are consumed in the bricks and 40 cords of wood in the arches.

This method is a great improvement over the former one, not only in expense but in saving time. Four days only are required to burn a kiln,

while formerly fourteen to sixteen were necessary, where wood alone was employed, and the expense is reduced about three-fifths. The bricks being somewhat porous, permits the air to penetrate to the particles of anthracite diffused through their substance, and the heat is thus applied just where it is required, and without loss; and the wood is necessary merely to raise the temperature of the bricks to such a point that the anthracite shall begin to burn.

The principle involved in this improvement has been long in use in Europe; and in England their brick earth is required by law to be mixed with a certain proportion of the ashes of stone coal, which always contain much coke or half burnt coal, and which during the burning, performs the same office as the dust of anthracite, and makes hard burnt bricks. Many improvements have been made in the brick manufacture within a few years, and they are all in use in the brick yards on the Hudson river. The most important are those for grinding the clay, for moulding by machinery, and the one for burning that has already been mentioned. At Carpenter's yard, below Peekskill, the grinding and moulding are effected by steam power. The clay and sand banks in the clay and tertiary deposits along the banks of the Hudson, contain the elements of wealth and industry which will require a great length of time and the most favorable circumstance to exhaust.

ROCKS OF NEW-YORK, WESTCHESTER AND PUTNAM COUNTIES.

The rocks of these counties are numerous, many of them are applied to useful purposes, and they are every where abundant, and are seen cropping out from the surface of almost every hill and ravine. They will be discussed in the following order, viz:

1. Granite.
2. Gneiss.
3. Mica Slate.
4. Quartz Rock.
5. Talcose Slate.
6. Limestone.
7. Sienite.
8. Serpentine.
9. Steatite.
10. Augite Rock.
11. Greenstone.

The metalliferous and mineral contents of these rocks will then be described.

I. GRANITE.

This rock occurs abundantly in New-York, Westchester and Putnam counties.

It presents all varieties of texture, from a very coarse grained rock, to one almost perfectly compact. In colour it varies as much as in texture. It is white, red, gray, yellowish and bluish-gray, according to the colour of the minerals forming it. The colour of the feldspar usually determines that of the mass. It occurs in beds, in veins, in interstratified masses, and in knots, knobs, and protruding masses, in which no connection with veins or beds have been traced. The more common mode of its occurrence is in beds, 10 to 100 feet thick, interstratified with gneiss. Some of the granite is too coarse for use as a building material. Some is too compact and hard, being in fact, eurite; others are well adapted for building. Different localities show a great variety in strength, and in the ease or difficulty of dressing, as well as in the ease of quarrying and the magnitude of the blocks that can be procured. In the geological report of last year, it was mentioned that many places would undoubtedly be found in the Highlands, where fine quarries would be opened, and furnish "building materials of the best quality, and which would endure the changes of our variable climate for ages, without decay or disintegration." The investigations of the past season, have verified the prediction, that such localities might be found. The materials are of the best quality, easily quarried in large blocks, suitable for columns, cornices, &c. easily dressed, enduring as time, as the naked crags themselves will testify; and several of the localities, which were unknown to their owners, are so convenient to water transport that the blocks can be swung directly on board vessels in the Hudson, by means of cranes. When we consider the value attached to the quarries in Maine, Massachusetts and Connecticut, where, in most places, it is necessary to haul the stone, either on a common road, or construct a rail-way to navigable water, a distance from half a mile to six or seven miles, and observe that notwithstanding all these disadvantages, the great outlay of capital, and the distance to a market, that they make it a profitable business, we may begin to appreciate the importance of having inexhaustible quantities of materials, as good, as beautiful, as durable, and as easily quarried and dressed, on our own waters, within forty or sixty miles of the city of New-York, and so convenient to shipment, that no rail-roads and hauling are required. In order that the reader may be able to judge of the value attached to the quarries in Maine, I may be permitted to quote a portion of Dr. Jackson's Second Annual Report, on the Geology of Maine. "Many of the Maine quarries can furnish regular dimension

stones, of excellent granite, on board ship, at \$1.12 per ton, and the expense of transportation to New-York is rarely more than \$2.50 per ton. Now there are but few cities where this article will not sell for at least \$7 per ton, which will give a profit of \$3.38 for each ton of granite.

“ At the base of Mosquito mountain, beside a huge pile of rocks that have fallen from the mountain’s side and exposed a steep precipice of naked rock, the Frankfort Granite Company have begun extensive operations for obtaining building stones. Thus far they have wrought only those detached blocks, that lie in confused heaps at the base of the mountain, by which much expense is saved in quarrying.

“ This quarry was first wrought in the month of May, 1836; since that time more than \$50,000 worth of granite has been sold. It has been mostly sent to New-York, and is there used in constructing the Albany Exchange.

“ A considerable sum, no less than \$20,000, has been expended in digging a large sloop canal from the river to the base of the mountain, and that work must have consumed a considerable share of the proceeds from their sales; but when the work is complete, it will so favor the shipments as to make ample returns to the company.

“ The whole mass of Musquito mountain is composed entirely of granite, and its height is 527 feet above high water mark, while the diameter of the mountain is at least twice the measure of its height, and it must contain at least five hundred millions of cubic feet, equal to 30,000,000 tons.

“ Rough split granite sells for \$5 per ton, of 14 cubic feet, on the wharf at Kennebunk port. The price remains uniform up to the dimensions of 26 cubic feet; and above that measure, two cents per foot is charged for every additional foot.

“ Stones for store fronts, hammered, sell for 75 cents per superficial foot. Where two sides of a stone are fine dressed, and two rough hammered, three sides are charged, and nothing is demanded for the ends. Where three sides are fine dressed, and one rough hammered, they charge four sides and not for the ends.”

LOCAL DETAILS OF GRANITE QUARRIES AND LOCATIONS SUITABLE
FOR QUARRIES, IN PUTNAM AND WESTCHESTER COUNTIES.

Blunt's Quarry.

This is located on the south side of Break-neck Point, near the line between Putnam and Dutchess counties. There is an inexhaustible supply of a material of the best quality. It is a bluish-grey granitic rock, composed mostly of a dark coloured feldspar, with some hornblende, quartz, and occasionally a little mica. It is more properly sienite than granite. It is scarcely as dark as the Quincy granite or sienite, while it is as beautiful, has about the same strength, splits as well, and is as easily dressed. The stone from this quarry has been extensively used in the construction of the Delaware Breakwater, of Fort Calhoun and Fortress Monroe. The mountain rock has not been quarried at this place, but only the large masses that have tumbled from the cliffs above. It is not possible to give an accurate estimate of the quantity of granite in this vicinity, but there may be in the end of the mountain 500 acres, with an average depth of 500 feet, or 803,640 cubic yards to the acre, or 401,720,000 cubic yards on 500 acres. Blunt's quarry is located on the immediate shore of the Hudson river, but on account of the flats, the stone has been hauled about sixty rods to a landing. This quarry bids fair to become valuable; but there is one disadvantage that *may perhaps* operate as a draw-back to its advantageous position. It is overhung by a precipice of several hundred feet in height, and in the quarrying operations, the heavy blasts may bring down hundreds of thousands of tons of rock which can be useful only for dock stone and ballast.

HIGHLAND GRANITE COMPANY'S QUARRY.

This quarry is principally owned by Messrs. Howard & Holden. It is located one-fourth of a mile from the Hudson river, and half a mile east of Blunt's quarry, near Break-neck Point, and about two miles from Cold Springs. It is elevated about 400 feet above the Hudson, in full view of the river.

The stone is of excellent quality, and splits easily into large blocks. It is composed principally of feldspar, with a little hornblende, and is indistinctly stratified, or at least, it lies in thick, heavy beds, with parallel seams, six to twelve feet apart, and which are slightly inclined to the horizon. The quarry is inexhaustible, and ought to be very valuable. This quarry is on part of the bed of granitic rock, described under Blunt's quarry.

The stone is now hauled to the landing, about one-fourth of a mile, at an expense of 3 cents per cubic foot, or 42 cents per ton. Much of it is sent to Sing-Sing for the culverts and aqueduct bridges; and the freight to that place is 4 cents per foot, or 56 cents per ton. It is delivered at Sing-Sing in blocks of ten cubic feet and over, at 35 cents per cubic foot, or \$5.90 per ton.

The dressing of this stone for the arches, is done at $14\frac{1}{2}$ cents per superficial foot, and about two and a half superficial feet are dressed to the cubic foot, which make the stone dressed, ready for the arches, cost 70 cents per cubic foot, or \$9.97 $\frac{1}{2}$ per ton.

This quarry is capable of being worked at least 70 yards in depth, over an area of several acres; and allowing a profit of \$1 per cubic yard, which is a low estimate, and 4,840 square yards to the acre, 50 yards in depth, ought in the course of working, to give a profit of \$242,000 to the acre.

Stony Point, 1 mile NW of Cold Springs, Putnam county.—This is a rocky peninsula, stretching into the Hudson, about one-fourth of a mile. It is composed of gneissoid rocks, except the NW point of the peninsula, which is a granitic rock of the same character as that of Blunt's and the Highland Company's quarries. About two acres of this peninsula are covered by this rock, to an estimated mean depth of forty-five feet above high water mark, and it may be estimated that there are 145,200 cubic yards of granite capable of exploration on this point. It may apparently be split out in masses of any size, up to 100 tons or more, in regular blocks, and it lies immediately on the Hudson river, and with such a depth of water that large vessels may come immediately along side of the rocks to be quarried, so that the blocks may be swung on board with a crane.

Stony Point is owned by Mr. Philips of Philipstown, who was not aware of the existence of such a location for a granite quarry, until he was informed of it during the progress of the survey of Putnam county, during last summer.

PHILIPS' QUARRY.

This belongs to the same gentleman as the preceding. It is located on the Philips estate, about half a mile from the Hudson river, and one and a half miles ENE of West-Point. The rock is perfectly indestructible, and would be called granite by those who should see the blocks, without seeing the quarry. It is gneiss, in thick layers or plates,

which have a slight inclination to the west, while the grain of the rock is nearly vertical. It splits easily, both in the direction of the grain and across it. It may be procured in the form of blocks of 5 to 10 or more feet square, and of the thickness of the plates of rock, which are from 1 to 4 feet thick. Some masses were seen which had been split off for columns, for store fronts, 12 to 14 feet long, by $1\frac{1}{2}$, $1\frac{3}{4}$, and 2 feet square.

The rock at this quarry is of a light gray colour, almost white, and is a beautiful material for building. It is durable, of sufficient strength, easily dressed, and easily quarried, and the stone can be transported to the banks of the Hudson, for three to four cents per cubic foot.

The extent of this rock was not ascertained; but there is an area of at least 10 acres, with a mean depth of 60 feet, or 26,136,000 cubic feet, or 968,000 cubic yards of this granitic gneiss, or about 1,900,000 tons.

There is a location suitable for quarrying, in Putnam county, about three and a half miles below West-Point, and near the Cotton Rock.* The granite or granitic gneiss is of good quality, of a light gray colour and durable. This locality was not examined closely, but from the general aspect of the rock, it is believed to be a good location for a quarry.

There are two locations for fine granite quarries on the estate of Gen. Van Cortland, on the shore of the Hudson, in Westchester county, between Anthony's Nose and Peekskill. The granite has the appearance of stone of superior quality, perfectly indestructible, and has every external aspect of quarrying easily in large blocks. It is inexhaustible in quantity, and lies upon the shore of the Hudson river, with deep water along side, so that the facilities for shipment are almost unrivalled.

It is estimated that several millions of dollars are annually paid out of the city of New-York, and the towns on the Hudson river, for building stone, brought from beyond the limits of the State, while we have within our own boundaries and near the markets, inexhaustible supplies, of

* The Cotton Rock is a noted place in the Highlands. It is on the shore of the Hudson, in Philipstown, between high and low water mark, about three and a half miles below West-Point. The rocks here are impure verd antique, (composed of limestone and serpentine, with brucite and other minerals imbedded,) serpentine, with diallage and veins of asbestos and delicate silky amianthus, diallage rock, augite rock, and granite. The amianthus which comes from the veins in the serpentine, has the appearance of cotton or of raw silk, and has given rise to the name "Cotton Rock."

equally good quality, which can be quarried, shipped and hauled at less expense than the stone we now import from Maine, New-Hampshire, Massachusetts and Connecticut. The granites of the Hudson river *must* then, soon be wrought and sent to market, and the quarries will become very valuable.

II. GNEISS.

Gneiss is the predominant rock in New-York, Westchester and Putnam counties. It varies greatly in external aspect and in composition in different parts of the tract under investigation. Its colour is dependent upon the relative abundance of its constituents, which are variously coloured in different localities. The feldspar is white, reddish, or of a bluish gray; the mica is black, brown, yellow, copper coloured, and white; the quartz is white, gray or smoky. In some places mica abounds in the rock, and it approaches to mica slate, but more commonly the feldspar is most abundant, and gives character to the rock.

Much of the gneiss in the Highlands of the counties under consideration, is a hornblendic gneiss, in which the mica is wholly or in part replaced by hornblende.

A range of granitic gneiss, of a light colour, passes through Putnam and a part of Westchester county. It extends through Carmel, near Pine pond, by Mahopack pond, thence southwardly, and crosses the turnpike from Peekskill to Danbury. Another bed extends from Boyd's corners in Putnam county and crosses the Peekskill and Danbury turnpike about five or six miles from the former place. These beds are quarried to a small extent, for use in the vicinity; but they are too remote from water transport, for quarrying at present, for a more distant market. It is durable, of a light gray colour, easily split from the quarry, and easily dressed. If these strata reach the Hudson river, they are believed to have changed so much in aspect and quality as building stone, as not to have been recognized as the same beds. The bluish gneiss is quarried at Gen. Van Cortland's quarry, near Royd Hook, two miles west of Peekskill. Another quarry is opened near Peekskill Landing, half a mile northwest.

A range of reddish gneiss extends NNE from the point above Tarrytown. In many places excellent quarries may be opened, where the stone quarries well, dresses easily, and is beautiful and durable for architectural purposes. One quarry is already worked to some extent in this range, for the New-York market, on Mrs. Beekman's farm, about one and a half miles from Tarrytown. Large quantities of stone are taken

from this quarry to be used in the construction of the culverts and bridges of the aqueduct that leads from the Croton river to supply New-York city with water.

Numerous other quarries have been opened along the line of the aqueduct, in the bed of gneiss just spoken of, and in others, to supply stone for this great work. It is not doubted that several of these quarries which lie near water transport, will be wrought for the New-York and other markets. Our citizens do not yet appreciate the prospective value of good quarries on the banks of the Hudson river.

Another range of gneiss, suitable in many places for quarrying, extends from near Manhattanville, on New-York island, by White Plains and so on NNE, probably into Connecticut, or Putnam county. It enters the valley of the Bronx river about eight or nine miles below White Plains, while it forms a part of the range of hills on the right bank of that, for several miles below.

At one locality in this range, the rock is quarried to some extent, to furnish the stone for the aqueduct bridge across Mill river, near Yonkers or Philipsburg. It is an excellent, beautiful stone, but rather hard to dress. This stone will last as long as it will be required to endure, and it seems indestructible.

A gneiss quarry has been opened two miles east of Yonkers, on the land of Elijah Valentine. The rock is of a superior quality, and is used in the construction of arches in the aqueduct. The proprietor receives a rent of 12½ cents per cubic yard for the stone.

The facts of scientific interest connected with the gneiss ranges, will be retained until the final report.

III. MICA SLATE.

This rock has a very limited distribution in New-York, Westchester and Putnam counties. Where it does occur, it seems to be a modification of gneiss, the mica becoming predominant, while within a short distance, the rock resumes its characters of gneiss. No locality was observed where there is prospect of valuable quarries of flagging stone, of this kind of rock being opened, near water transport. A locality of mica slate, well characterized and fissile, may be seen, forming a point in Haverstraw bay, half to one mile northwestwardly, from Henry I. Cruger's mansion. This rock assumes the characters of gneiss, two or three miles NNE of the point above referred to, and thence continues its course in the line of bearing of the strata.

IV. QUARTZ ROCK.

This rock is of small extent where it is visible; but from the localities where it has been seen being nearly in a line, it is believed that it forms a continuous stratum through a portion of Westchester and Putnam counties. It is probably a continuation of the stratum described in the Second Annual Report, as forming a part of Peaked and Elbow mountains in Amenia and Dover, in Dutchess county, and as probably a continuation of that described by Prof. Hitchcock, in the west part of Massachusetts.* The granular quartz rock crops out on the bank of Peekskill bay of the Hudson river, about half a mile NW of Peekskill landing, near Hall's Point. The strata are nearly vertical, leaning a little to the WNW. It ranges up the "Peekskill Hollow." It is seen in connection with the iron ore, at Bradley's ore bed, in "Peekskill Hollow," about ten miles from Peekskill, and again it occurs near Boyd's corners, in Carmel, Putnam county. It is quarried to a small extent, near Boyd's corners, for door steps, hearth stones, and other purposes. It splits out in regular slabs, from 3 to 9 inches thick, and 3 to 7 or 8 feet square, with an uniform plane surface, and is admirably adapted for a flagging stone for streets, cellars, &c. Other locations may be indicated in the descriptive geology of the county; but only one was observed, where the stone was good for quarrying for flag stones, near water transport.

This belongs to _____, of Peekskill. It is at the mouth of Peekskill creek, a little north of Hall's Point; and it is believed that a valuable quarry of flagging stones, of the granular quartz rock, may be opened at this place. The strata are nearly vertical, and the stones may be split off with great ease, if the quarry be opened in a proper manner. The flagging and curb stone used in New-York, and many other towns, are now brought from the Bolton and Haddam quarries, in Connecticut, and from the graywacke quarries in Greene county. Some of these stones, which are very beautiful, sell for fifty cents per square foot. The Bolton and Greene county stone, are carted from eight to sixteen miles over bad roads, and then shipped to a market. If stone, as beautiful and as durable, can be dug on the shore of the Hudson, where no cartage is required, and where the expense of quarrying is no greater than at the quarries mentioned, and where the business is now very lucrative, it follows, that such quarries on the shore of the Hudson would be very valuable.

* Vide Second Annual Report on the Geological Survey of New-York, page 172. Vide Hitchcock's Geological Reports of Massachusetts, 1833, pages 22, 321.

V. TALCOSE SLATE.

This rock is limited in extent. It occurs in Westchester and Putnam counties, forming a range of hills several miles in length. It forms Blue Rock Point, on the post road, between the crossing of Peekskill creek and Annville. The slaty laminæ are parallel in direction to the limestone, and granular quartz rock on the east, which dip at an angle of from 75° to 85° to the ESE. This rock forms the principal mass of the hills to the NNE of Blue Rock Point for several miles. Gallows hill, a place celebrated during the Revolution, (in consequence of the public executions,) is a part of this range of rock. The rock is generally covered by soil, except where it has been denuded by water, or excavations for roads, &c. The soil is of good quality and produces fine crops. Farther northeast, this rock is rarely seen, but it passes up Peekskill hollow, and up a valley two or three miles west of Boyd's corners in Putnam county. It is very refractory in the fire, and is used for the in-walls of furnaces. Localities may, perhaps, be found, where slates for roofing may be quarried with advantage. The rock is very fissile, and splits in thin laminæ of some magnitude.

Diluvial scratches were observed on the out cropping edges, in many places, where the surface was exposed by uncovering the rock in making and repairing the roads. They are very distinct on the road that passes from Gen. Van Cortlandt's mansion over Gallows hill, on the western declivity. Like hundreds of similar localities observed last year in Columbia and Dutchess counties, the general direction is from north 20° to 30° west, to south 20° to 30° east. Veins of quartz were occasionally seen traversing the talcose slate. In some places, the quartz was loaded with pyrites, and where the slate had decayed and the masses of this mineral were scattered about on the ground, they had the spongy texture similar to the quartz from the veins and nests in the slates of Columbia and Dutchess counties. The cavities are also frequently filled with oxide of iron, like the quartz in the gold region of Virginia and North-Carolina. No gold was however seen, and it is hoped that a sufficient number of fruitless researches for *gold, silver and coal* have been made in this vicinity to deter others from future enterprises of such a nature, where the *expense is certain*, and the returns so *very, very uncertain*.

The talcose slate, at its junction with the gray and whitish limestones, is highly loaded with carbon and with pyrites. The one has given origin to the reports and stories of valuable coal beds in this region, and the other to the existence of gold and silver mines.

The slate and limestone glazed with anthracite, and presenting many points of resemblance to anthracite coal, are sufficient to excuse the conclusions of those who have supposed the existence of workable coal beds, and who did not know that such deposits have not been found in primitive rocks.

VI. LIMESTONE.

This rock is abundant, and extensively distributed in the counties of New-York, Westchester and Putnam. It is all associated with primitive rocks, such as gneiss, mica and talcose slates, and with granite, and is interstratified or embraced as beds in these rocks. In colour it varies through white, gray and clouded to black; in texture it is coarsely crystalline, granular, and perfectly compact: in composition, it varies from pure carbonate of lime to magnesian and ferromagnesian carbonate of lime, with variable quantities of earthy impurities: in hardness, from a very strong stone to one so friable as to be capable of being crushed to sand by pressure in the hand.

This rock is of greater present as well as prospective value in the region of country where it is found, than any other, unless it be the granite, which may, in progress of time, become equally valuable.

Limestone of New-York County.

This rock abounds in the north part of the island, and has been quarried to a considerable extent for marble, building stone, and for lime. The details of this rock in New-York county will be found in the descriptive geology of that county by Prof. Gale, in the appendix to this report.

Limestone of Westchester and Putnam Counties.

The limestone of these counties has the same dip and line of bearing as the contiguous gneiss and gneissoid rocks, and like them, is distinctly stratified. They all dip to the ESE, (as a general rule, but there are local exceptions,) at a high angle, varying from 45° to 90° . The limestone forms several nearly parallel ranges at intervals of to three or four miles apart, ranging in a NNE and SSW direction.

1st. The most eastwardly deposit of this kind, and of any great magnitude, is seen on Gouverneur Morris's farm, opposite Harlaem, where it is quarried for making the piers for the rail-road bridge and for other purposes. It is generally gray, and in some places is much intermixed with mica. Many of the blocks, and even the rocks in place in the

quarries, have so much the aspect of gneiss, that close inspection is necessary to distinguish them. The limestone rock again appears in the bed of a small brook between Harlaem and West Farms village. It is thought probable that the West Farms and the Eastchester marble quarries are in this range of limestone, which passes up the valley of the Bronx river by White Plains and Rye pond, and so on further to the NNE.

2d. Another range passes from near Macomb's bridge in a NNE direction, is crossed by the aqueduct, and passes about two or two and a half miles west of White Plains.

3d. Another crosses from New-York Island at Kingsbridge, and thence ranges NNE, and forms the shore for some distance.

4th. Another ranges from Dobb's ferry in the same general direction by the county poor-house and Ackerman's iron mine.

5th. Another ranges NNE from Sparta, by Sing-Sing, about a mile east of Pine bridge across the Croton river. Some parts of this bed are pure white marble; some are dolomitic, and some have the aspect of gneiss, until closely examined.

6th. Another ranges from Verplanck's Point NNE to near Peekskill, where it changes its direction to the east. A mass of limestone, with a transverse line of bearing, viz. east and west, occurs near Henry J. Cruger's mansion, two and a half miles southeast of Verplanck's Point. It is supposed to be a displaced, outheaved mass from the preceding range.

7th. Another range extends up the valley of Peekskill creek from its mouth, and is a continuation of that in Rockland county, at Tompkins and Marks's quarries, associated with the same rocks.

There are many smaller bodies of limestone, some of which may be parts of the above beds, as there are several lines of transverse stratification, and lateral heaves and faults, that, in some places, render the tracing of the continuity of the beds a matter of much difficulty, and requiring more time than was at my disposal. These beds above described have not all been traced out continuously, and there may be some error in some of them, and there may be more beds than have been indicated, but these bodies are the principal ones.

LOCAL DETAILS OF THE LIMESTONE BEDS.

A small quarry is opened in the white limestone on the farm of Elijah Martin, two and a half miles WNW of White Plains. M. Cassels estimates its surface width at one-eighth of a mile. It is associated with mica slate.

The West Farms marble quarry is about one and a half miles from West Farms. Little is now done there, although the stone is of as good quality as is usual for this stone. 40,000 cubic feet of marble were quarried there in 1837. The proprietor receives 64 cents rent per cubic foot of marble raised. Some large blocks have been quarried, and from appearances more may be procured with little labor. The value of such quarries may be estimated from the rent received by the proprietor, which for 40,000 feet, the produce of last year, gives \$2,500 for one year's rent. The excavation is small, and apparently the opening of the quarry is but commenced. The refuse stones of the quarry are burnt into lime for manure, with dust anthracite coal, which can be purchased at the coal yards in New-York for 75 cents per ton.

The Eastchester marble quarry is near the road from White Plains to New-York, and near the left bank of the Bronx river. The marble is white and crystalline, and is distinctly stratified, though some of the strata are several feet thick. The dip is about 80° westwardly. The strike north 32° east. It is worked by Kane and Morgan, and there are few quarries in the country more extensively worked. They sell about 60,000 to 70,000 cubic feet of marble per annum, a large portion of which is in large blocks from two to twenty tons weight, for columns and cornices of large buildings. The heavy blocks wrought into the forms required sell for from \$4 to \$5 per cubic foot. The smaller ones for \$1 per foot. This quarry affords great facilities for obtaining large masses. At the time of my visit, they were quarrying a block 150 feet long, 8 feet thick and 7 feet broad. This was then to be blocked up into such sized and shaped masses as might be desired, and which can be done with little waste. It was estimated that this block would be worth \$20,000. This quarry was opened in 1822, and has been more or less extensively worked to the present time. The marble is transported five to six miles, and then shipped to New-York and other places.

The Limestone of Bedford.

This was examined by Prof. Cassels. It is white and gray in different beds, crystalline, and not easy to crumble by the action of the wea-

ther, and Mr. C. thinks it adapted for use as a marble. It was opened a few years ago for making lime, and it is said to have made lime of good quality. This limestone locality belongs to a Mr. Frost.

The limestone of Cross Pond in Westchester county, was examined by Prof. Cassels. It alternates several times with gneiss in the breadth of one-fourth of a mile. He states the strike of the rock at N 30° E, and the dip at 80° westward.

Limestone interstratified with gneiss was also seen by Mr. C. on the banks of Long pond, and between Long and South ponds.

The strike of these beds is about north 70° east, and dip 60° eastwardly.

Good lime was made here twenty years ago, but the expense of wood has stopped the operations.

Limestone occurs at Bedford village, opposite the boarding school, where it was examined by Prof. Cassels.

Granular limestone occurs four miles northeast of Sing-Sing at Sarlis' Hotel, where it was observed by Prof. Cassels.

Limestone crops out on the hill ESE of Peekskill. It is much contorted and variously clouded, and some of it may, perhaps, be used for an ornamental marble. It also crops out near the lower dock at Peekskill, and is bounded on the east by hornblende rock.

A bed of limestone occurs five miles from Peekskill, on the road to Crum ponds. It is a dolomitic limestone that is used for marble, for making lime and for sand. For the latter purpose, the crumbling rock is crushed by a stone roller, and the mortar is said to set well in which it is used. Similar sand in some other parts of the country will *not* form a strong mortar.

Limestone of good quality occurs on Abra'm Miller's farm, on Mill creek, which is the outlet of Crum ponds. The locality is stated by Prof. Cassels, who examined it, to be five and a half miles southwest of Somerset plain, and three miles SSE of Crum Ponds village. The strike is north 30° east, and dip 75° eastwardly. Mr. Miller has made lime from the stone of his quarry for four years. He makes five kilns of lime per annum, each of 600 bushels, the average price of which is 50 cents per bushel at the kiln. Twenty cords of wood at \$3 per cord, are used to a kiln, and six days are required for the burning. The lime-

stone lies in high knobs, and can be easily opened on the northeast side, and Prof. Cassels thinks good marble may here be obtained. This locality is about two miles west of Whitlock village, through which it is supposed the New-York and Albany rail-road will pass.

Limestone was seen by Prof. Cassels on Plumb creek, about a mile west of Somerstown plains, on the Peekskill road. It occurs along the road for about half a mile.

Limestone occurs about two miles north of Phittlockville. It is also said to occur on Mr. Todd's farm, about a mile east of the locality above, where it has been used for making lime. Prof. Cassels saw it again about three-fourths of a mile south of the crossing of Titicus river. It is here abundant, and fine quarries might be opened. It crops out on the road side occasionally all the way to North Salem, where it is abundant and highly crystalline. A stratum of limestone was seen by Prof. Cassels about a mile north of Owenville, and again about a mile and a half west of Peach pond.

A marble quarry is opened nearly opposite Harlaem, in Westchester township, one-fourth of a mile north of Harlaem bridge. It is gray and white, and more or less mixed with mica. It is quarried for the piers of the rail-road bridge. The strike is north 25° to 30° east, and dip 80° WNW. It is associated with gneiss, with which it was seen in contact on the east side.

A bed of *dolomitic limestone* occurs near the county poor-house of Westchester county. It is called sandstone by the people, because it crumbles to sand by exposure to the weather. The same bed was seen at intervals to Dobbs' ferry. It crosses the valley of a small stream near the church on the hill at Dobbs' ferry. It forms the shore below Dobbs' ferry. A quarry is opened in this bed one-eighth of a mile from the shore of the Hudson, a mile below Dobbs' ferry, and a rail-road and wharf have been constructed to facilitate the transport and embarkation of the marble. Lime has been burnt from this stone on the shore, and some of the rock has been transported to New-York and burnt.

The *Sing-Sing marble quarries* are extensively wrought by the convicts of the State prison. Almost all of the limestone of these quarries crumbles by exposure to wet and frost, though it frequently requires many years to disintegrate. Near the surface the rock is perfect dolomite, covered by calcareous sand from the crumbling of the rock. At a greater depth the rock is sound, hard and tough. The bluish

marble seems the most durable, though all crumble. Mr. Wiltse, the superintendent of the prison, informed me that the crumbling stone, when put into walls, became harder. This stone is extensively used for buildings, but in many instances it has already begun to crumble by exposure to the weather.

Lime is made from this limestone at the quarries, not only for consumption at the prison, but for sale. Large quantities of the stone are sold for the New-Jersey lime kilns, where it is burnt with dust anthracite coal for manure.

This stone is also used as a flux in the Cold-Spring furnace. For the above purposes of lime and flux, the stone is sold at the wharf at 37½ cents per ton.

Limestone lines the shore from Sing-Sing landing to Sparta landing, where its contact with granite is seen. The limestone here has the aspect of having been upturned, and its layers pitch down towards the granite. Augite, Asbestus, and other minerals are much intermixed with the limestone near the granite. The strata of limestone north of the prison are nearly vertical, and as distinctly stratified as gneiss. Crystallized pyrites, magnetic pyrites, and sometimes copper pyrites are found in particular layers of the rock.

The limestone beds pass under the town and must occupy a breadth of one-fourth of a mile.

A bed of limestone is opened on the hill northeast of Sparta. It is coarsely crystalline, and very beautiful. Small pieces of serpentine, and traces of iron and copper pyrites were observed very sparsely disseminated through the mass.

A bed of limestone is quarried for lime about 30 or 40 rods west of Hardy's hotel, at Verplanck. This stratum is bounded on the west by hornblende slate, and on the east by hornblende rock. This stratum crosses the road about three-fourths of a mile NNE of Hardy's hotel.

Limestone forms the shore at Verplanck landing, and skirts it for one mile to one and one-fourth miles up Peekskill bay.

Near Verplanck landing the limestone is much injected with veins of hornblende, so as to unfit it for making lime. This place is well worth the attention of geologists, as showing the intrusion of one rock into another. At a small distance north of the landing the limestone is free of hornblende, and is nearly a pure limestone making very good

lime, and which is said to be equal to the Thomaston and Rhode-Island lime. As to the quantity of stone here accessible and adapted for lime, we may estimate the mean height above high water mark at 21 feet over an area of 50 to 80 acres, lining the shore of the bay nearly a mile in length. Each cubic yard of rock will make at least 4 barrels of lime, including the necessary waste. This would give about 135,000 barrels to the acre, or for 60 acres, 8,131,200 barrels of lime. Two kilns were burning as perpetual kilns at the time of my visit. They produce 25 barrels of lime per diem, with a consumption of one ton of anthracite coal.*

The expense of quarrying the stone is about 36 cents per cubic yard, or 9 cents per barrel.

The expense of coal is about 25 cents per barrel.

The lime was stated to be selling at New-York, at the time of my visit, for \$1.50 per bbl. giving a profit after deducting every expense, including teams, attendance, freight, casks and cooperage, of 53 cents per barrel.

If we allow a nett profit of only 25 cents per bbl. an acre of this limestone of 21 feet thick, is capable of yielding a clear profit of \$33,880.

Limestone was observed in two places between Verplanck and Henry I. Cruger's, by the upper road. One was near the church.

A bed of limestone of much economical importance occurs on H. I. Cruger's farm, about three miles southeast of Verplanck. It forms the shore half a mile east or southeast of Mr. C.'s mansion, and it extends eastward from the shore into the interior. Some of it is adapted for a marble, which may be obtained in blocks of considerable size on the shore. It is already quarried for lime, the stone for which is shipped to New-Jersey, where it is burnt for the New-York market and for manure, with dust anthracite coal at a small expense, and with a handsome profit. The stone is sold to the vessels at 37½ to 50 cents per ton on the shore where it is quarried.

This bed of limestone forms the shore of Haverstraw Bay for more than a mile, extending from the mouth of the brook near H. I. Cruger's saw-mill to the mouth of another small brook on Nicholas Cruger's farm.

* This stone must be difficult to burn, or else the coal is not used to advantage, either from a defective form of the kiln, or bad management of the workmen.

Some estimate of the value of these limestone beds may be formed from the fact that the blocks can be swung on board sloops by means of cranes without any land transport, and that each acre may be made to yield from 100,000 to 500,000 barrels of lime, or for shipment; each acre will on an average yield about 100,000 tons of stone suitable for burning.

Limestone, variegated and clouded, occurs one-fourth of a mile south or southeast of Annville, across the marsh from the village near the mouth of Peekskill creek. It may, perhaps, be used for a marble, but in places it is intermixed with mineral substances which might be an injury to it in polishing and sawing. Its thickness could not be ascertained, as it was mostly covered by the tertiary formation that forms the high steep banks of 60 to 100 feet deep. Its range is NNE and SSW, and its dip about 70° to the ESE.

The same bed of limestone is again seen on the right bank of Peekskill creek, one-fourth of a mile above Blue-Rock Point. It is on land belonging to Gen. Van Courtland, and has been quarried to some extent. It is gray, bluish and variegated, in some places white, and makes good lime. Its range or strike is NNE, and its dip nearly vertical. On the west it is bounded by the talcose slate, and at the contact the rock is black, in some places glazed with anthracite, or a substance like it, and it is loaded with cubic crystals of iron pyrites.

This limestone reappears near Gen. Van Courtland's mill, one mile north of the locality just mentioned.

Limestone makes its appearance as knobs or hills, fifty to one hundred feet high, about two or three miles north of Annville, in the valley west of Gallows hill.

Limestone was observed about one and a half miles south of Putnam Court-House, on the farm of a Mr. Townsend, at two old mine holes, where some have supposed that silver, and others that marble was the object of exploration. It is scarcely necessary to add that no traces of silver ore could be distinguished. Both these excavations are in a bed of limestone about thirty rods apart. The bed is narrow, perhaps twenty feet wide, and is bounded by gneiss on each side; the strata are highly inclined to the east-southeast. Brucite and some coccolite were observed in the limestone of the northwardly excavation. At the other locality the limestone is very white, coarse grained, and contains imperfect crystals of phosphate of lime or green augite.

A bed of limestone containing brucite, serpentine and asbestos, is associated with the bed of magnetic oxide of iron on Mr. Tilly Foster's farm, two and a half miles southeast of Putnam Court-House.

Above Patterson in Putnam county, is an extensive bed of limestone. Many hundred acres in this valley are underlaid by limestone. It is quarried for lime, and forms a superior article. Sixty cords of wood are consumed in burning a kiln of 2,000 bushels. The price of this lime is 50 cents per bushel. Much of this stone seems well adapted for a building stone. Some of the rock contains beautiful tremolite.

A bed of impure limestone crosses the Cold Spring turnpike near Haight's tavern, in Phillipstown, five miles northeast of Cold spring; another bed is supposed to cross the road one-half mile north of Warren's tavern in Phillipstown; another bed crosses the road on the hill near Indian brook, between the Highland school and Warren's tavern; another near Mr. Ardens, two miles south-southeast of West Point; another near Philips' mill, one and a quarter miles east of West-Point; another at Cotton Rock, three miles south-southeast of West-Point; another still below, on the shore of the Hudson; two others on the shore, and a quarter of a mile east, near the old silver mine; another at the White mine on Anthony's Nose mountain; another three miles east-southeast of West-Point, near the Post road; another near Davenport's tavern, five miles northeast of Cold Spring; and another on Mr. Theodore Hustis' farm, one mile north-northeast of Davenport. All these localities are supposed to be in the same bed of limestone which is exposed in these various points, and probably in many others. Hustis' quarry is in the limestone bed above mentioned. Some parts of the hill are granular limestone, and a part is nearly compact magnesian limestone or miemite. Serpentine is frequently intermixed, forming a verd antique marble, which may, perhaps, at some future time be applied to use. Several fine minerals occur at this locality, which was discovered by Dr. Barratt in 1822. The precious serpentine of this locality is perhaps not surpassed in beauty by that of Newburyport or Easton, or even any locality known. It occurs crystallized distinctly with various modified forms. White coccolite, white augite, diopside, sahlite, phosphate of lime, amianthus, asbestos, pearl spar, pyrites, chromate of iron, magnetic oxide of iron, and various other minerals occur at this locality. The bed of limestone at this place forms a bed twenty to fifty feet thick, resting against granite or scinite on the west, while a stream flows at the base of the hill. It is difficult to determine whether it can be quarried with advantage, but it lies in nearly vertical strata on the

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steep face of the hill, at the foot of which, and within sixty yards, is a fine creek, with water power sufficient to saw a large quantity of the marble, if the demands of commerce should require it.

VII. SIENITE.

This rock abounds in some parts of Westchester and Putnam counties. In Westchester county it approaches in its characters to the "Quincy granite" of Massachusetts, and would probably make as beautiful and durable a material for building as that which is justly so celebrated. In Putnam the sienite is generally coarse grained, of a reddish colour, spotted with black crystalline and irregular masses of hornblende. This rock passes into hornblende slate and hornblende gneiss on the one hand, and into hornblende rock on the other. No localities were seen in Putnam county where this rock would be available for economical uses, except the granitic sienite, which has already been mentioned under the head of granite, as occurring in Break-neck mountain, and at Stoney Point above Cold Spring.*

The sienite of Westchester county is composed of feldspar of a dark grayish colour, containing a little black hornblende. It forms the shore of Peekskill bay of the Hudson river, from about one-half mile to one and a half miles below Peekskill, on the eastern side of the bay. It forms the mass of some of the hills for four or five miles southeast of Peekskill, and valuable quarries of this rock may be opened, if it can be brought into notice and use. It is a durable and beautiful stone, and may be procured in large blocks, but it is more labor to dress it than many of the granites and sienites sent to market.

The same rock east of Verplanck, is changed to a black hornblende rock, with but little feldspar, and it contains magnetic oxide of iron disseminated in grains. One mile east of Verplanck it is coarsely crystalline and jet black. Beautiful specimens of hornblende may be obtained there. The jet black colour of this mineral has caused excavations to be made in these hills to find coal,† a search that every one who knows

* The mountain at the northwest corner of Putnam county, is frequently called Anthony's Nose and Anthony's Face, in consequence of the profile bearing a rude resemblance to the human face, that may be seen in one position in passing it; but Break-neck mountain is the name by which it is generally known. Anthony's Nose mountain is at the southwest corner of Putnam county, opposite Fort Montgomery. Stony Point, above Cold Spring, I propose to call Quarry-Point, to distinguish it from Stony Point in Rockland county, a place of much notoriety in the annals of the revolution.

† Another excavation for coal was made near the landing at Peekskill. It was in gneiss in which there was a seam of plumbago, or black lead, mixed with pyrites. It would burn for a time, in consequence of the carbon and sulphur, but was not adapted for a combustible, even had there been an abundance of it. A great noise was made in the papers for a time, but the

any thing of the associations of minerals with each other, would at once know was perfectly fruitless. The great weight of the hornblende has induced others to suppose that iron ore would be found here, which is possible, though no workable beds have been as yet discovered. In many places there is so much magnetic oxide of iron in the hornblende that the magnetic needle will not traverse freely in the vicinity of the beds. Where the hornblende is decomposed, a deep red soil is produced, coloured by the oxide of iron, and which is highly productive under judicious treatment.

Several quarries may probably be opened to advantage between the Hudson, Crom pond and Peekskill.

VIII. SERPENTINE ROCK.

This rock is found in several places in New-York, Westchester and Putnam counties, but no locality has been observed where it occupies an area exceeding 100 acres. Dr. Gale has described a locality on the island of New-York. A notice of it may be seen in his description of the Geology of New-York county, in the appendix to this report.—It is more or less mixed with steatite and a mineral that has been called anthophyllite. It is thought that blocks may be obtained suitable for ornamental architecture, but it is soft and easily scratched.*

Another locality of it may be seen on the peninsula east of New-Rochelle. It has been quarried to a small extent for a marble, but it is understood that good blocks, free from cracks, could not be procured. The serpentine at this locality shows almost every shade of colour and texture, from black to light yellowish gray, and from compact and crystalline to earthy. It is bounded by hornblendic rocks on the west, and by limestone more or less mixed with serpentine and with silicious matter on the east. Among the minerals noticed here, may be mentioned *verd antique*, *precious serpentine* of a red, green and yellow colour, *common serpentine*, green, yellow, gray, black, compact, granular and earthy; *jaspar*, *chalcidony*, *agate*, *drusy quartz*, *marmolite*, *hydrate of magnesia*, *carbonate of magnesia*, compact and crystalline; *tremolite*, *magnetic oxide of iron*, and *chromate of iron*?

miners soon lost the vein by sinking the shaft vertically, while the seam of plumbago followed the layers of the strata parallel to the dip.

* The term *marble* is at present restricted to those varieties of limestone that are capable of receiving a polish, and which are used for architectural purposes, but I think it would be well to include under this term some other substances that are, or may be used for ornamental architecture. Serpentine is one of these, and is called marble by those who have seen it polished, and did not know what it was.

The locality where the quarrying operations were carried on, was at high water mark, and they dug perhaps too near the level of low water. Good blocks of this rock could scarcely be expected free from cracks, where they had been exposed to the beating surf and the winter's frosts for ages. A large portion of the hill south of the beach, and of the locality at the southeast end of the beach, is composed of serpentine rock, and it is not impossible that quarries of some value may be opened there.

Another locality of serpentine rock, with radiating fibres of anthophyllite,[?] occurs in a southeasterly direction from White Plains three or four miles. I did not see it, but was informed of it, after I had left that part of the country. I had inferred the existence of such a locality from the boulders of this rock, which I saw scattered over the fields. Another locality is in Philipstown, Putnam county, about ten or eleven miles NNE of Peekskill, and about half or three quarters of a mile east of Horton's pond. The rock is of a blackish green, fine grained, and sometimes coarsely crystalline. It is yellowish on the weathered surfaces, and is associated with steatite. Ten to eleven acres seem to be underlaid by this rock, which might be quarried for an ornamental marble. It is about eight miles from water transport.

Another locality, one that has already attracted much notice, is Brown's quarry near Pine pond in Putnam county, four or five miles from Putnam Court-House, and one and a quarter miles NNW of the county poor-house. It is dark coloured, dark green to black, and from compact to a coarse crystalline, like coarse grained hornblende rock. It is granularly foliated like common white marble, polishes well, and is perfectly black when polished. It may be obtained in large blocks for sawing into slabs. Large blocks lie on the surface in Brown's lot, and the rock is seen in place all around the hill. In the mine lot adjacent, good blocks may probably be obtained by quarrying.

Twenty-five to thirty acres of ground are underlaid by this rock on the hill side, west of the brook, which is the outlet of Pine pond. It is easily accessible, and about 100 feet above the water level of the adjacent valley. Blocks of many tons weight can be easily procured; in fact many of this size are now lying on the surface, and require no blasting or splitting before they are put in the saw-mill. Magnetic oxide of iron, or chromate of iron, is disseminated through the serpentine in some parts of the serpentine bed, and this variety of the rock will not be suitable to work, as it can neither be sawed nor polished easily.

The quarry seems to be sufficient to supply the market, not only of our own country, but the world, with this kind of ornamental marble for a long time. It is really a beautiful material when polished, and it is hoped that it will be extensively used. I have seen no other locality where such a material can be obtained in so large blocks, sound and free from seams and cracks. A marble of this kind was used in ancient times in some of the old Spanish palaces, but it is exceedingly rare in Europe. Twenty acres of this rock belong to Mr. Ferry H. Brown,* one acre to Mr. J. W. Brinkruff, and the remainder to Mr. Fary, as the agent of the Hudson River Mining Company.

IX. STEATITE.

This rock is rare in the counties under discussion. It occurs on the island of New-York at the serpentine bed, but it is believed not to be of good quality. It is there mixed with anthophyllite. Vide Dr. Gale's Report in the Appendix.

Another locality was seen this year near Peckville, a little north of the line of Putnam county, and within Dutchess county. It is there intermixed with serpentine, and although abundant, and quarried in large blocks, it was found difficult to saw it well, in consequence of the different degrees of hardness of the steatite and serpentine. It is beautifully spotted and clouded, and a steatite indurates by heat, it is possible that it may at some future time be wrought as an ornamental stone.

Some of the masses of steatite are very pure, soft and easily wrought. In some parts of the bed the rock is granular, or scaly talc, either pure, or traversed in every direction by crystals of actynolite.

Another locality was seen in Philipstown, Putnam county, on a Mr. McCabe's farm. It is near the serpentine rock before described as eight or nine miles NNE of Peekskill, and half to three-quarters of a mile east of Horton's pond. The rock here graduates through every variety of aspect, from talc, through steatite to serpentine. I did not see proper soapstone or steatite rock adapted for useful purposes, *in place*, but was assured that large blocks had been dug there, and that there was an abundance of it. I saw slaty steatitic rock *in place*, and small masses of beautiful steatite scattered over the ground. Good quarries of this rock are well known to be very valuable. The blocks are worth \$20 per ton in market. This bed graduates on the east into serpentine rock.

* Mr. Brown sold his twenty acres a day or two after I had examined the locality, and had informed him of its value, for \$10,000. He had, a short time before offered it for sale for \$100.

X. AUGITE ROCK.

This rock occurs in a great number of localities in Putnam county, and in a few in Westchester county.

It is sometimes intermixed with feldspar, but more commonly it is either by itself, or mixed with the various minerals that are usually associated with it. It occurs at most of the celebrated mineral localities in the Highlands. It is of all shades of colour, from white through gray and green of various shades to black, and from compact through various grades of granular to broad foliated masses, in the forms of fassaite, coccolite, common augite, sahlite, crystallized augite and diopside. The localities of this rock, and descriptions of the minerals associated with it, will be contained in the final report of the survey.

This rock has not been applied to any useful purpose.

XI. GREENSTONE.

Greenstone occurs in many places in Putnam, Westchester and New-York counties, forming dykes, which traverse the other rocks like veins, or it is interstratified with them. Like the augite rock, it will be discussed in the final report.

It has not been applied to any use in the counties under examination.

SILVER, LEAD, TIN, COPPER AND TITANIUM.

Several mines have been opened in Putnam and Westchester counties, under the expectation of obtaining silver. I have examined a great number of ancient diggings in Putnam, Orange and Westchester counties, where it is reported or imagined that silver has been, or is to be found; but I have seen no indications worth pursuing, or any ore that contained silver, unless in the copper and silver mines at Sing-Sing. These ores have not been analyzed, and it is not known that they even contain any silver, except from the common reports of the country that silver has been obtained from them.

Almost all of the diggings are in or contiguous to limestone. Many interesting mineral localities have been opened, and an abundance of crystallized minerals dug out, and prepared for the hand of the collector of these beautiful productions of nature.

It is, perhaps, superfluous to go into a detail of the numerous mining explorations in search of the precious metals in the Highlands; suffice it to say, that superstition and the mineral rod have been freely employed, and credulous persons have permitted themselves to be imposed

on, and in some instances have expended their all, in explorations which any one versed in minerals and acquainted with their associations, would have known from the beginning were hopelessly fruitless. Common pyrites and magnetic pyrites were repeatedly brought to me while I was stationed at the U. S. Military Academy, as an instructor of chemistry, mineralogy and geology, as specimens of gold ore, silver ore and tin ore, by the mine hunters, or by those who had been imposed on; and so fully were they persuaded that the mineral brought contained what they supposed, that no assurance without experiments would convince them. After examining mineral localities where lead and tin ores had been said to have been discovered, I have seen none in place, and have reason to believe that the specimens shown to me did not originate where they were said to have been found.

A piece of metallic antimony was shown to me during the last summer, and was said to have been found in Putnam county, but it had the peculiar foliated crystalline texture that is generally seen in that which has been melted, and which is different in aspect from the native antimony. While on this subject I will notice another fact that came under my observation. Coal was said to have been discovered in the primitive region of Putnam county. I was shown a lump of beautiful *Mauch-Chunk anthracite!!* which had been buried by some means unknown and dug up, and this was the evidence of the reported coal mine. It is hoped that our citizens will no longer suffer themselves to be duped by designing persons into mining speculations, most of which have a baseless foundation.

"The copper, silver and lead mine" of Sing-Sing is on the State farm, a little north of the State prison. It was worked before the revolution by a British officer in New-York. A shaft was sunk 150 feet, and a level run in the line of bearing of the strata from the bottom. It was drained a few years ago by a mining company, but was not worked. The mine is now filled with water, and its former productiveness is not known. For the above information I am indebted to Gen. Ward, of Sing-Sing. The mine is in limestone. No indications of silver or lead ore could be seen in the continuation of the stratum in which the mine had been opened. Gen. Van Courtland remembers the time when it was wrought, and when a boy was in the mines. There was a thin seam, he states, in which native silver was found. Several levels passed in different directions under the river. Gen. Van Courtland relates an anecdote of a gentleman at a dinner party, after the wine had circulated freely, giving £4,000 sterling for one-sixteenth of the proprietorship of the mine. The rock is an impure limestone con-

taining augite and some magnetic sulphuret of iron, and when carefully tested by cupellation, gave no traces of silver.

Copper ore has been found in several places in Putnam and Westchester counties, but not in such quantities as to justify exploration.

Pyritous copper and green carbonate of copper are found in small quantities in the gneiss rocks at Phillips' mills, one mile and a quarter east of West-Point; also at Phillips' iron mine eight miles northeast of Cold-Spring landing. Pyritous copper, black sulphuret of copper, and green and blue carbonates of copper are found at Sparta, near Sing-Sing, and the surface indications were considered so favorable, that a mining company was formed, and chartered with a capital of \$100,000. It was sold by the company for \$1,000 to some persons in New-York, who incurred some expense in sinking a shaft and making an adit level from high water mark on the shore of the river to intersect the shaft. This adit level was to drain the mine as low as was practicable without the aid of machinery. Little ore was obtained, not enough, it is said by one of the old miners, to pay the expense of the candles used in driving the adit level. The ore is stated to contain some silver. A beautiful specimen of the ore was presented me for the State collection, by Mr. Cartwright, who discovered the mine and had the superintendence of it. The specimen is in the public cases in the geological rooms of the First District, in the capitol. Copper ore is found also in the marble quarries at Sing-Sing in a small vein. It occurs there as pyritous copper, black sulphuret of copper, and as the blue carbonate of copper. It occurs also in small quantities in the cliffs near the shore, about 100 yards southeast of the brick kiln at Sparta. It has also been found in small quantities in several places in the township of Mount-Pleasant, farther from the river. As it occurs in so many places in this vicinity in small strings and nests, it is not improbable that workable quantities of the ore may exist there, but I would advise persons to be cautious in investing capital for mining explorations. The working of metalliferous veins, with the exception of iron, has thus far in this country, been like a lottery, whether for gold, silver, lead or copper. There are some that have proved to be good investments, and have yielded permanent profits, but on an average, at least nine-tenths of them have cost far more than they have produced.

Titanium ore has been found in several places in Putnam county. At almost every locality where augite and scapolite are found associated, (and the localities are numerous) sphene or the silico-calcareous oxide of titanium is also found associated. Sphene, beautifully crystallized,

was discovered by Dr. Barrett, at Cold Spring landing in 1822, during the excavations for the foundation of the long block of buildings next the shore, on the north side of the village. Specimens were obtained at that place in abundance by Dr. Barrett, and more beautiful than any that I have seen from any other part of the country. Titanium has, however, been applied to but one useful purpose, and that of comparatively trifling importance, viz: for tinging the enamel of artificial teeth of a slight yellowish colour, like the natural teeth.

ARSENICAL ORES.

Arsenical iron occurs in several places in Putnam county, but the only locality known in that county to which any practical importance is attached, is about four or five miles northwest from Putnam Court-House, and about half a mile southwest of Pine pond, in the township of Kent, near the serpentine marble quarry. This is one of the old mine holes from which silver is reported to have been obtained. The mine is now owned or leased by a mining company, called the Hudson River Mining Company. It had been cleaned out when I saw it. The shaft is forty feet deep. Yellow pulverulent sulphuret of arsenic covered the sides of the shaft and the timbers, wherever they had been covered by water, resulting from the decomposition of the arsenical sulphuret of iron. This latter mineral abounds there. It forms a bed or mass in hornblendic gneiss rock above the shaft, and is there undergoing decomposition, forming arseniate of iron. The ore does not, so far as I could perceive, form a vein, but is a mass, and from the surface indications, and from what I saw in the mine, there is a probability of the existence of a great quantity of this ore. The mine goes by the name of the silver mine, and it is stated that silver has been obtained from it, but the individual who is said to have analyzed it, has no public name as a chemist, and until it shall be analyzed by a disinterested person of reputation as an analytical chemist, confidence ought not to be reposed in the statement that it is a silver ore. This kind of ore is wrought as a silver ore in Germany, where it contains some of the precious metal. It is possible this may also contain it, and even should it be argentiferous, it may not contain enough silver to make it worth separating.

The ore contains much arsenic, and it may perhaps be profitably wrought to furnish the common white arsenic of the shops. It is well known that large quantities of this material are consumed for various purposes in this country, such as the manufacture of shot, flint glass, medicinal preparations, &c. and the supply is at present derived from Germany. This mine would probably supply the demands of commerce

in this country for a long time, if it should be thought expedient to work it.

A loose mass of arsenical sulphuret of iron, weighing 200 or 300 pounds, said to have been dug out of the road, was seen about three miles west of the mine above mentioned, and perhaps a mile from Boyd's Corners, in Kent.

IRON ORE.

Pyrites.

Magnetic and common pyrites are found in almost every part of Putnam, Westchester and New-York counties.

They are frequently found by persons who do not know what they are, but think them gold, silver, tin or lead ores. It is superfluous to enumerate in *this report* (which is devoted to economical results) the various localities where these minerals have been found, or the excavations that have been made in search of the precious metals. A few localities only were observed where there is a prospect that the sulphuret of iron may be economized. In one part of Philips' ore bed, near the summit of the mountain, the magnetic oxide of iron is so much intermixed with pyrites, that it cannot be used as an iron ore in the furnace. In some places, the sulphuret of iron seems to have been a paste, in which the grains of iron ore are disseminated, but in general, it is not so abundant; one-half to one-sixth of the ore may be said to be pyrites. By exposure to the weather, sulphate of iron or copperas is formed, and it might be made artificially from the ore in large quantities, if other parts of the bed of ore yield it as abundantly as that which I saw.

This ore, by long exposure, loses all of its sulphuret of iron by decomposition, and the rains wash away the sulphate as it is formed. The ore is thus purified, and fitted for the furnace. By slightly roasting the ore, the operation would be much more rapidly performed, and copperas easily made. Sixty pounds of pure bisulphuret of iron, mixed with thirty pounds of iron borings or scraps, will yield about 278 pounds of copperas.

In the valley of Patterson, Putnam county, two localities were seen where pyrites occur in some abundance disseminated in gneiss. The rock may, perhaps, be employed at some time in the manufacture of copperas. They are about 100 to 200 yards west of the junction of the gneiss with the limestone.

Another locality is on Jedediah Wood's farm, 6 miles SSE of Putnam Court-House, where it has long been supposed there was a lead mine. Pyrites are abundant in the gneiss rock near the eastern brow of the hill, and copperas effloresces on the face of the rock. Excavations have been made in two places where the pyrites abound, and the stratum was traced about 200 yards along the face of the hill. Some curious experiments have been made here with the magic glass and polished stones placed in the crown of a hat, in the way of mine hunting, by persons who seem to have been perfect dupes to their own believed power of discovering mines by this method: but they have found the people less credulous than themselves, and have not succeeded in discovering the pretended mines.

Another locality is a quarter of a mile east of Luddington's store, about six miles north of Putnam Court-House. The pyrites is in a gangue of hornblende. Copperas effloresces, and causes the rock to crumble to sand. It is in a small digging on the west side of the mill pond. Lead ore is said to have been found in the hill north, but no traces of it were discovered.

Many localities of pyrites were observed, which will be mentioned in the final report, under the head of mineral localities.

IRON ORE.

Limonite.

Limonite in small quantities, under the forms of compact brown oxide of iron, hematite and bog ore, occurs in many places in Putnam and Westchester counties. The loose masses scattered over the surface of the earth, seem to indicate important beds in Putnam county. If surface indications are worthy of notice, a bed of hematite and brown iron ore will probably be found in the hills near the county poor-house, in Putnam county.

A bed of limonite, containing some oxide of manganese, occurs very near the line between Philipstown and Carmel, in Peekskill hollow, about ten miles northeast of Peekskill. Its thickness is not known. Fifty to one hundred tons of the ore may be seen in heaps on the ground. The ore was dug many years ago, but it seems to be too silicious to work well alone in the furnace. By proper mixture with other ores, it might be wrought with advantage. Isaac Lockwood owns a part of the land underlaid by this ore. The right of digging the mine is vested in Nathaniel Bradley, of Conn. who purchased a large amount of mineral property in the Highlands some years ago.

The ore is associated with granular quartz on the east, and probably with limestone on the west, but this latter rock was not seen near the ore beds. These rocks are associated in the above order at the mouth of Peekskill creek.

A bed of hematite, of excellent quality, as far as the eye can judge, occurs on James Ackerman's farm, about one and a half miles north of the county poor-house, and four or five miles ENE of Tarrytown, in Westchester county: thirty tons of the ore were dug in 1837, and carried to the furnace at Cold Spring, Putnam county. It had not been used in September last, but it will undoubtedly make good iron. There is, probably, an extensive bed of the ore. It is associated with white limestone, and this range of rock reaches the banks of the Hudson, a little below Dobbs' ferry. It is possible that beds of similar ore may be found connected with the limestone near the river. Should this be, the ore beds would be valuable, as there would be but little cartage to water transport. An acre of iron ore, only three feet thick, ought to yield the owner at least \$4,000 if he leases it to those who dig it for fifty cents per ton.

Bog ore was seen on Judge Kemey's farm, one and a half miles south of Sing-Sing. It was about eight inches thick, but it seemed to occupy an area of only a few square rods, and in an economical point of view is scarcely worth notice. As a mineral, it is well characterized, and makes beautiful cabinet specimens.

Red ochre and *red chalk* occur on H. I. Cruger's farm, in Cortlandtown. It is presumed to be abundant from the appearances at the locality. It has been opened a little, by persons who wished to obtain small quantities of these materials. Specimens are deposited in the State collection.

Magnetic Oxide of Iron.

This ore abounds in Putnam county. Several mines are already wrought, and many more are capable of exploration. They form masses in gneiss and hornblendic gneiss rocks, which, by casual examination would be called beds; but after a careful investigation of the facts, I think they may be called veins. Their course is parallel to the line of bearing of the strata, and they lie parallel to the layers of rock, but by close examination, it is found that in several instances, after continuing with this parallism for a certain distance, the ore crosses a stratum of rock, and then resumes its parallism, then crosses, obliquely, another, and so on. In other places, where a great bed of the ore occurs at

some depth, only a few small stripes of ore penetrate through the superincumbent mass to the surface, as if the rocks had been cracked asunder, and these small seams of ore had been forced up from the main mass below. The beds or veins of magnetic iron ore lie either vertical, or dipping to the ESE, at an angle corresponding nearly to the dip of the strata. One example, only, was observed where its dip was to the WNW, viz: at the Stewart mine. The ore is very variable in quality. In some it is nearly pure magnetic oxide of iron; in others it is intermixed more or less with the materials of the contiguous rocks; in others, it is mingled with pyrites and with other minerals. Two main veins of this ore will be described under the names of the Philips vein and the Simewog vein. Numerous localities are known where this ore occurs, and where it has been dug in small quantities. They will be mentioned under the head of local details.

LOCAL DETAILS.

A bed of magnetic oxide of iron has been opened on Break-neck mountain, and several tons taken from it. The extent of the bed is not known, and the ore has not, it is believed, been smelted.

Another bed has been opened on the northeast part of Constitution Island, opposite the West-Point foundry.

Another was opened in the middle of the island. The ore occurs, disseminated in granite near the redoubt, above the Target rock on Constitution Island. Magnetic oxide of iron is thickly disseminated in limestone, near Philips' mill, one and a fourth miles east of West-Point; and it is found in that stratum of limestone in many places, from the above locality to near half a mile south of the "Cotton Rock," a distance of three miles.

It also occurs in the granite rock that is associated with the augite and limestone rocks near the old "silver mine"* three quarters of a mile southeast of Conslook Island, and one mile northeast of Anthony's Nose mountain.

A bed was opened many years ago on Anthony's Nose mountain, but it contained much pyrites and crystallized phosphate of lime, both of which injure the ore for the manufacture of iron.

* This mine was opened in ancient times, for what purpose is not known. Stalactites are found in the adit level, which is 200 yards long, and old tools with the handles rotted out have been found in it. It was reopened some years ago with the hope of getting silver—the man who worked it having been told that the scales of plumbago in the rock were sulphuret of silver. He is said to have spent all his property, and to have died in a mad-house.

The brown spar at the "White Mine," about one mile east of the western summit of Anthony's Nose, contains magnetic oxide of iron disseminated.

A locality of magnetic oxide of iron occurs on Mr. Tilly Foster's farm, two and a half miles southeast from Putnam Court House.

The ore forms a large part of a hill about one hundred yards long, ten to forty feet broad, and elevated twenty to thirty feet above the ground adjoining. Some hundreds, perhaps thousands of tons of ore can be easily procured at this place, without digging below the level of the hill.

Another ore bed was discovered some years ago about half a mile southwest of the preceding, on land belonging to the Misses Fowler. Some tons were dug out, but I do not know whether any has been smelted.

The Simewog vein passes through Simewog hill, and was traced one and a half miles SSW on Mr. Jedediah Wood's farm, and it is supposed to continue still farther SSW, as ore has been dug in that direction, about one mile SSW from Mr. Wood's house.

This vein was formerly extensively worked at Simewog hill, and the mine is called Townsend's mine.

This mine was the first known and first worked in this part of the country. The ore was carted to great distances and shipped on the North river, and some of the towns on Long Island Sound, to various parts of the country. The largest portion of the ore was carried to Danbury in Connecticut, and was there an article of traffic. It has not been wrought for twenty or thirty years, in consequence of other beds having been found in more convenient locations for smelting and transport. Fifty thousand tons of ore, at least, have been taken from this mine, estimating four tons to the cubic yard; and 100,000 tons more may probably be taken from the vein in Simewog hill, without going below the level of the small stream which flows across the ore bed. Should it ever be necessary to obtain this ore in quantity, (as is probable, from the prospect of the New-York and Albany rail-road passing up the valley on the east side of the hill,) at least 1,000,000 tons may be calculated on, above the water level of the Croton river, which flows along the base of the hill, and free from the expense of drainage, by driving an adit level from the level of the Croton, a distance of 300 or 400 yards to intersect the vein. This vein of

ore has also been worked to the extent of several thousand tons, near the road, and north of the little stream mentioned above as crossing the vein. The vein here is from 8 to 14 feet thick, and nearly vertical in position, between strata of gneiss and hornblendic gneiss, which dip 70° to 85° to the ESE. On Simewog hill, one-fourth of a mile south, the vein, is from 3 to 20 feet thick, associated with similar rocks and with granite. It has been wrought on Simewog hill from 30 to 60 feet or more in depth over a length of 300 to 400 yards. It is scarcely doubted, from the observations made, that this vein is at least two miles in length, with an average width of 6 feet. Its depth cannot be estimated, but it is presumed that the labor of ages could not exhaust it in depth, as the bottoms of such veins have never, in any country, been found. In the estimates above, the calculation is based upon the vein being wrought down to the water level of the adjacent valley.

The Philips vein has been traced at short intervals for about eight miles, and is presumed to be continuous through this distance, except where it is interrupted by dykes and transverse heaves of the strata.—Many mines have been opened on this vein, and several of them are now worked.

The Cold spring and Patterson turnpike crosses this vein of iron ore near the crest of the mountain, about nine miles from Cold Spring landing. There is an opening near the road, and near this crossing, where some ore has been dug. Here the ore seems injected in little sheets, veins and beds through the gneiss rock, so as to form one-fourth to three-fourths of its mass through a horizontal thickness (as the strata are vertical) of 30 to 35 feet. Pyrites abound in a portion of the bed. The ore is easily traced along its course, as it shows itself distinctly along the line of bearing of the strata, disseminated, and forming black stripes in the rock. Near the house, one or two hundred yards farther SSW, another small opening has been made; 100 to 200 yards farther SSW on the line of the vein, a larger excavation has been made, and 500 to 800 tons of the ore thrown out, but it is here so much intermixed with pyrites as to be unfit for smelting, until the pyrites shall have decomposed. Some hundred yards farther SSW on the line of the vein, another opening has been made next the marsh, and is continued down the hill. The ore is here more or less intermixed with the rock, with a breadth of 10 to 20 feet, and the gneiss and hornblendic gneiss rocks associated, dip to the ESE at an angle of about 60° .

Farther down the hill are the two main openings, which go by the name of 'Philips' mine. The ore in some parts of the upper mine is more or less intermixed with copper pyrites, which injures the quality of the iron. The mine has been wrought badly, timbers being used to prop the overhanging rock, and great masses have crushed in and filled most of the mine.

The lower mine, where the whim is placed, has a solid rock roof, a part of the ore bed having been left in the top of the hill, while the mine has been worked below. The ore bed is here 15 to 20 feet wide, and has been wrought 30 to 40 feet in depth, over a length of — yards. The ore here is nearly a pure magnetic oxide of iron, and 20,000 to 30,000 tons of ore have probably been taken from these two mines.* Other openings have been made along the line of the vein for about half a mile farther to the SSW, and some 3,000 to 5,000 tons of ore probably removed. The rock in which this part of the vein thus far described, is contained, is mostly feldspar, with some bluish quartz.—Hornblende is also common. The feldspar is sometimes pearly in lustre and gray in colour, with wrinkled and bent faces, as if it had been soft and subjected to forces acting in different directions.

The next mine that is worked to any extent on this vein is the Stewart mine. It is about twelve feet thick of pure ore, and four feet more of lean ore. The former is much used in forges, the latter in the blast furnace. The ore at this mine is purer than that of any other mine I have seen, and is easily worked in the forge. It is granular, and easily broken and crumbled into grains about the size of BB shot, and is called by the miners "shot ore." The vein lies between strata of feldsparitic gneiss, which dip to the WNW about 70°. This mine is on the east side of the mountain crest, and about 100 to 200 feet above a marsh, with a steep declivity, and might easily be wrought to that depth without drainage, by driving an adit level to intersect the vein.

About half a mile SSW is another opening by the road side, where some ore has been dug, but it is lean, and much intermixed with the gneiss rock.

About three-fourths of a mile SSW of this is the Denney mine. It is about two and a half miles ENE of Warren's tavern in Philipstown, in a straight line, on one of the crests of the eastern ridge of the High-

* *Green hornblende, actinolite, green hyalite, green and blue carbonate of copper, pyritous copper, crystallized magnetic oxide of iron in the form of the acute rhomboid, common pyrites, and acicular gypsum (efflorescent), were seen in small quantities at these mines.*

lands. The ore seems to have been injected among the rocks. In some places it forms regular stripes on the surface of the rock, parallel to the line of bearing, in others, there are scarcely any indications on the surface, while extensive masses exist a short distance below. This cap of rock over the ore is frequently called by the miners a rider, and the ore below, the horse. The mine now at work north of the house, is about 30 feet deep, and the vein of solid ore 25 feet wide, overlaid by a cap or rider of rock which contains but little ore.

Most of the ore is very compact and pure, but some contains hornblende. Much of the feldspathic rock contiguous to the vein is injected with thin veins of ore from one-eighth to one inch thick. 200 yards SSW is another opening from which much ore has been taken. This place has been excavated to a depth of 60 feet, and the vein is 20 to 30 feet wide. 20,000 to 30,000 tons of ore at least have been removed.

Contiguous to this opening is another 30 feet deep to the water, with a sheet of rock 5 or 6 feet thick, between two divisions of the vein. The rocks on each side of the vein are more or less injected with thin veins of ore; from examining the locality, many suppose that the ore has been injected into the cracks and crevices of the rock when broken up by some upheave.

This ore is delivered at the Cold Spring furnace, and at the wharf at Cold Spring, for \$3 per ton, and mined as it is, scarcely any profit can be realized at this price. The quantity mined here is 600 tons per annum.

The Coal Grove mine is about one or one and a half miles SSW of the Denney mine. It is in gneiss. The vein is narrow at the surface, but at the depth of 12 feet it is 4 feet wide. The ore is of an excellent quality, very rich, and well adapted for the forge, and will, undoubtedly, make an excellent iron. The distance from this mine to the furnace and Cold Spring landing, is less than from the other mines.*

The Gouverneur mine is about one and a half miles SSW of the Coal Grove mine, and four miles east of the Philips manor house, at the southeast corner of the water lot. The ore is much intermixed in the rock, but would perhaps work well, mixed with other ores to flux out the feldspar and other minerals. It may probably be purer farther down. It has been opened in several places along the crest of the mountain to a depth from 3 to 12 feet.

* The Kemble mine is a short distance NNE of the Coal Grove mine, and on Philips' vein.
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A slight opening has been made about three-fourths of a mile NNE of the Gouverneur mine, between that and the Coal Grove mine. The ore is titaniferous and in lumps, and disseminated in the rock. The vein is 6 to 12 feet wide. It may perhaps be worked by picking the the ore, so as to separate the lumps from the gangue.

The mines and openings just described are the principal ones on the Philips vein, but the ore can be found along almost the whole line.*— It follows the crest of the east ridge of the Highlands a distance of at least eight miles. The breadth of this vein has been mentioned at different places from 3 to 30 feet wide. Its average is probably about 12 feet, and its length, as now known, about 14,000 yards. If the mean average of the vein be supposed to be half its bulk of ore, every cubic yard will contain about two tons of ore, and would yield at least one ton of iron, or each yard in depth would make 56,000 tons of iron. The vein, by proper working, can be mined to a mean depth of 100 yards, without expense of drainage, more than the proper opening of adits. We may place the workable produce of this vein above the water level of the adjacent valleys at 5,600,000 tons of iron.

The Cold Spring furnace is the only blast furnace in operation in the counties of New-York, Westchester and Putnam. It is supplied with magnetic oxide of iron from the Philips mine, the Denney mine in Putnam county, and from the Townsend mine in Canterbury, and the O'Neil mine in Warwick, Orange county. These ores are mixed in certain proportions and flux each other easily with a small addition of the Sing-Sing limestone. The produce of this furnace is from 1,000 to 1,400 tons of pig iron per annum.

Bonnel's forge in Philipstown is believed to be the only one in operation in the counties under consideration. It is supplied with the shot ore of the Stewart mine.

ECONOMICAL GEOLOGY OF ROCKLAND AND ORANGE COUNTIES.

General Remarks.

These counties may be classed under four divisions, each of which is distinct in aspect and agricultural features, as in its mineral products.

*The phenomena of the mines in many places induce the idea of igneous injection, connected with a powerful upheaving force. The feldspar is often pearly, wrinkled, and with bent laminae. The appearance of hyalite, a mineral usually associated with volcanic and trap rocks; the apparent injection in their veins among the seams and gneisses of the rock; the appearance of the softening of the gneiss and bending its layers like a flowing slag, seem to point to an igneous origin of this vein. It often has the appearance of a bed, and at other times of a vein ramifying from a main mass between the strata, and at other times cutting obliquely across them, but still having its outcrop parallel to the line of bearing.

They are the mountainous region called the Highlands, and composed of primitive rocks; the slate and graywacke region of Orange county; the red sandstone and the trap rocks of Rockland county.

The tertiary and alluvial deposits might also be classed as two more divisions, but their area is not so great or their physical features so striking. *The Highlands in Rockland and Orange* are a continuation of those of Putnam and Westchester counties, and are similar in general aspect, in the kinds of rocks, and in their mineral products. The rocks consist of gneiss and hornblendic gneiss, granite, sienite, limestone, hornblende, serpentine, augite and trappean rocks. The strata dip to the southeast at angles from 50° to 90° , but there are localities where the strike and dip are transverse to the general directions. The strata are intersected by seams transverse to the direction of the strata, and nearly perpendicular to the line of bearing, and at intervals of 100 to 10,000 yards. Dislocations and vertical and lateral heaves have occurred along many of these lines of fracture. The outcropping edges of the strata are not parallel to the line of bearing, but like the ridges slope gradually down to the northeast, while on the southwest steep escarpments range along the lines of faults. Many of these faults are upon an enormous scale, and render the tracing of narrow beds of rock of economical value a matter of no small difficulty. There are no continuous ridges of mountains of more than a few miles in length, in consequence of the interruptions caused by dislocations and lateral heaves of masses of the strata. The hills of similar rocks succeed each other in echelon lines, which seem to have been caused by lateral heaves along the lines of fault. In consequence of this, neither the line of outcrop nor the line of bearing is parallel to the general direction of the Highlands, but ridge succeeds ridge, each of which runs out and diminishes in height until it disappears below the rocks, which are generally considered of more recent origin. For example, a traveller passing in Rockland county from southwest to northeast, along the base of any of the large hills of a mountain, if he continues his course without turning off to the east, around the point of a succeeding mountain, he will soon find himself in the midst of the Highlands. If he be travelling in the opposite direction along the base of one of the mountains, and continue his course, he will find himself receding farther and farther from the mountains as he passes each succeeding terminating hill. If he be travelling on the northwest flank of the mountains, the reverse will hold true, and progressing southwest from Cornwall, New-Windsor, or Newburgh, he will soon find himself entering the mountains and following through the valleys, will emerge on the southeast face of the Highlands. These valleys are called "cloves,"

and Smith's clove is a noted example. It is the one through which the New-York and Newburgh turnpike passes, without ascending more than a few hundred feet.

The Ramapo river flows through this to the south, while another stream, a branch of Murderer's creek, flows in the opposite direction. For local details on the rocks of the Highlands of Orange county, except those near the Hudson, the reader is referred to the descriptive geology of that county, by Dr. Wm. Horton, in the appendix to this report. The land of this region produces tolerable crops where it is capable of tillage. It is good grass land. The principal portions of the mountain region are used for growing timber and fire wood for the New-York market, for furnaces and forges.

The slate and graywacke region of Orange county is accurately described by Dr. Horton in the appendix to this report. In the general direction of dip, it corresponds with the primitive rocks of the Highlands, pitching to the southeast, and apparently passing under them.

The slate rocks lap around the terminating ridges of the primitive rocks of gneiss, granite, &c. and continue a greater or less distance up the valleys between the ridges, like water in the bays and re-enterings of a coast, but the dip of the strata, with the exception of some local contortions and transverse upheaves, continues parallel to the general directions of the lines of bearing and of dip. This is a rich agricultural region, celebrated for its fine grazing and grain farms.

The red sandstone region of Rockland county is a fine agricultural district. The land is in some parts much broken and stony, but in general it is rolling, with a rich sandy loam, resulting from the disintegration of the subjacent sandstone and its associated shales, marls and limestones. The strata are in general slightly inclined (1° to 3°) to the westward, but near the granitic rocks, near Grassy Point, they dip southwardly at a considerable angle, ranging from 15° to 45° . This rock occupies that portion of Rockland county from Grassy Point along the base of the Highlands to New-Jersey, and eastward to the Hudson river, but a portion of its area is covered over by trap rocks.

The trap region of Rockland occupies much less of the surface of this county than one would suppose in passing up the Hudson river. It forms a narrow belt along the shore of the Hudson, from the New-Jersey line, to near Haverstraw, where it ranges off to the northwest and then west, and finally southwest near the base of the Highlands, where

it disappears. A branch of it strikes off about two miles north of Nyack in a westerly direction, and extends, with perhaps some interruptions, to near the Highlands. These ranges of trap rock are narrow, from one-fourth to one mile, and in some places perhaps one and a half to two miles broad. Along the Hudson, and on the north front of the range extending west from Haverstraw, the trap rock forms high mural columnar escarpments, of 300 to 800 feet in height, with a steep slope of debris, which have been crumbled off from the cliffs above by the action of the weather and the frost.* On the western and southern sides of this range, the trap rock generally slopes off more gradually, but in a few places it is precipitous. It can scarcely be considered otherwise than an enormous projecting trap dyke. Dykes were observed in several places cutting through the sandstone, some of which were very large. Occasionally it was seen spreading laterally from the dykes between the strata of sandstone. Many facts of high scientific interest were observed. They will be detailed in the final report on the Geological Survey of the State.

ALLUVIAL DEPOSITS.

Fluvatile Alluvions.

There are no alluvions of importance of this kind above water, that may not be classed as salt marshes. Tappan, Haverstraw and Peekskill bays are becoming more shoal by the deposition of alluvial matter in many places, and the larger steam-boats cannot go in to Dobbs' ferry, Tappan Slote, Nyack or Haverstraw, in consequence of the shoal water over these mud flats. There is a broad channel through these bays of considerable depth, but in many places the water is shoal nearer the shore, and large areas are becoming gradually more shallow, so that we may reasonably anticipate the time when they shall become land. The flats along the right bank of the Hudson, opposite West-Point, both below Gee's Point and near Camp-Town, have grown sensibly more shallow within the last fifteen years, during which time they have been under my observation. The same may be said of the flats between Constitution island and Gouverneur's landing, opposite West-Point, and between Constitution island and Cold-Spring.†

* There are several places where valleys pass through the trap range above described, but it is believed there are none where this rock is discontinued. The valley west of Nyack is perhaps the lowest, but even here the trap is seen at the summit of the valley.

† In 1822, sloops used to come in at the foundry dock, about half way between Cold-Spring and the West-Point foundry, to take in their freight of cannon and other castings from the foundry, but the water has become so shoal that for some years past it has not been possible, and they now load at Cold-Spring.

Narrow flats extend along the shore in several places between West-Point and the base of Butler-Hill, and a broad one extends from near Cornwall to Newburgh. At New-Windsor, a long wharf is built out partly across the flats, but large sloops cannot land there except at flood tide. A few acres of pebbly alluvion have been formed at the mouths of two small streams that empty into the Hudson at Washington's valley, about one mile above West-Point.

Salt Marshes.

A salt marsh of several hundred acres extends from near the landing at Dobbs' ferry to near the long wharf at Tappan Slote. Large quantities of salt hay are made here every year.

Another salt marsh of 200 acres or more extends from Grassy-Point up the Sampsondale and Mimshecongong creeks to near Haverstraw.

Another small one is west of Stony Point in Rockland county.

Another of several hundred acres extends from about one mile south of Fort Montgomery, between Waggon's islands and the main land to within one mile of Dunderberg Point, near Caldwell's Landing in Rockland county.

Another occurs at the mouth of Murderer's creek, in Orange county, between Cornwall and New-Windsor.

These marshes all produce a fine crop of salt hay every year.

Peat.

Several of the salt marshes contain peat, but that which I saw is fibrous, and of inferior quality. That of finer texture and quality may probably be found at a depth of four or five feet. A moderate estimate of peat of second quality in these salt marshes, would be 500,000 cords.

A peat bog of about 40 acres was examined by Prof. Cassels, about one mile south of the Long clove, in Rockland county. It is on land of Isaac B. Van Houten. It is supposed to have a mean depth of six feet, and may be estimated to contain 40,000 cords.

Another is in the valley of the Hackensack river, about two miles west of Nyack, and contains about 50 acres with a mean depth of six feet, and may be calculated to contain 50,000 cords.

Peat, a few acres in extent, was observed by Prof. C. at the north end of Rockland lake, perhaps 5,000 cords.

Prof. C. reports a peat bog of 40 acres on land of John Snediker, one mile southwest of Snediker's landing, with an average depth of six feet of good peat, equal to 40,000 cords. This peat bog is wrought for the New-York market. It was opened during the last summer.

The proprietor receives 25 cents per chaldron.

The cartage to dock, 37½ do do.

Freight to New-York, 37½ do do.

Expense of digging and curing, 50 do do.

\$1.50

This peat sells in New-York at \$3 per chaldron, or \$4.50 per cord, or \$4,500 per acre.

Prof. C. observed a bog of 50 acres of peat between the lower village of Clarkstown and the Hackensack river. Its average depth is stated to be six feet, and will probably yield 50,000 cords. It is on lands of William O. Blines, Levi J. Gurnee and others.

Extensive peat bogs were observed on the mountain, near the turnpike from Haverstraw to Munroe works. One contains about 40 acres, another about 50 acres. These two bogs may be estimated at 100,000 cords.

Some other smaller bogs were seen containing 20,000 cords. Another was seen in the valley of Stony brook, containing 10,000 cords.

At the north end of Long pond, near the west line of Rockland county, a deposit of peat was observed. Its magnitude was not ascertained, but it may contain 10,000 cords.

A peat bog of about ten acres occurs about one mile southwest of Stony Point, and may be estimated at 10,000 cords.

Several small peat bogs were observed near Fort Montgomery, that in the aggregate may contain 10,000 cords. There is a small peat bog south of Fort Putnam, and near it; another southeast; another southwest; all within one-fourth of a mile. They may be estimated to contain 6,000 cords.*

* Beneath the peat is a white substance that might be mistaken for marl, but that it will not effervesce. Prof. Bayley, of West-Point, has ascertained that it is composed of the silicious coats of microscopic infusoria. A similar substance has been seen in many of our peat bogs.

A peat meadow occurs on the mountain, half a mile west of Round pond, five miles southwest of West-Point, on land of Mr. Wilkins, and contains 10,000 cords.

A small peat bog was seen between the limestone ledge and Duck-Cedar pond, in Warwick, and may contain 4,000 cords. A peat bog was seen near the Patterson mine, containing probably 5,000 cords.

Another near the Crossway mine, containing 30,000 cords.

Another east of the Sterling mine, containing 50,000 cords.

Another, of 60 to 100 acres, was seen in the valley of Smith's clove, between Wike's and Galloway's. It contains probably 200,000 cords.

A peat bog lies west of Townsend's ore bed in Canterbury, and contains 10,000 cords.

In the slate and graywacke region of Orange county, peat is every where abundant, and the localities are so numerous that it would be tedious to enumerate them. The drowned lands, the Graycourt meadows and the Black meadows are the most extensive of these deposits. The former marsh is most extensive, and contains 17,000 acres. At a low estimate, there must be 25,000 acres of peat bogs in Orange and Rockland counties, that have not been estimated, and we may calculate, in round numbers, that they contain 25,000,000 cords of peat.

The aggregate cords of peat before enumerated, is 1,140,000 cords, and the total estimated amount of the peat in Orange and Rockland counties may be put at 26,140,000 cords, or about 72,000,000 chaldrons.

MARL.

No fresh water shell marl was observed in Rockland county: Dr. Horton found it abundantly in the peat bogs in the slate formation of Orange county, but the quantity has not been estimated, from the want of sufficient data. It is hoped that our farmers will make a proper trial of this material on their lands. The reader is referred to Dr. Horton's report on Orange county, in the appendix to this report, where the use of this material as a stimulant manure, is discussed.

TERTIARY DEPOSITS.

The tertiary deposits of Rockland and Orange are similar in composition, texture and superposition, to those of Putnam and Westchester counties, and which have been described. One of these deposits ex-

tends from Verdrietje Hook, below Haverstraw, to Stony Point; another lines the shore from Dunderberg Point, above Caldwell's Landing, to one and a half miles below; others of the pebbly and gravelly varieties, at an elevation from 100 to 200 feet above the river, overlaying the gneiss and granitic rock, extend at short intervals from Fort Montgomery to two miles above West-Point. A clay deposit lies in the valley, and near the shore between the Crow's Nest and Butter Hill mountains; and another extends from one mile west of Butter Hill Point, by Cornwall and New-Windsor, to Newburgh.

The tertiary deposits extend up the valleys of the streams, and are spread more or less extensively over the interior. They attain an elevation of 300 to 500 feet above the Hudson. Those on the banks of the Hudson are nearly uniform in height, and their surface is from 150 to 200 feet above tide water. Pottery of a coarse kind is made in Canterbury, and perhaps in some other towns in Orange county, but the principal economical use of the clay beds of the tertiary deposits of Orange and Rockland counties, is for the manufacture of bricks. In Rockland county, bricks are made as follows:

At Hodge's yard, at Grassy Point, they made in 1838,...	2,500,000
Wm Holmes' do do ...	2,000,000
Mumer's, do do ...	3,500,000
Mackay's, at Haverstraw, do ...	2,500,000
Churchill's, below Caldwell's Landing, do ...	1,000,000
Lent's, do do ...	500,000
	<hr/>
	12,000,000
	<hr/>

In Orange county, bricks are made as follows:

At F. Clark's yard, in Cornwall, in 1838,.....	1,260,000
Cronkites, do do say	1,500,000
W. Stringham's, do do	1,000,000
N. Audam's, do do	3,000,000
M. L. Sproat's, Walkill, do	300,000
S. C. Wood's, Goshen, do	300,000
Norris', Newburgh, do	2,100,000
Anderson's, do do	300,000
	<hr/>

Total bricks made in Orange county in 1838,.... 9,760,000

The sand of the tertiary is extensively used in the towns along the Hudson, in lime mortar, for walls, plastering, for laying pavements, and for brick making, and for moulding sand. For the latter use, it is worth 25 cents per bushel, and sand banks for these various uses on the banks of the Hudson, are valuable.

The gravel banks, also, when near the towns, are valuable, and yield a handsome revenue to their proprietors, for supplying earth for grading streets, filling, and for furnishing paving stones.

The soils of the tertiary formation in these counties are good, and yield abundant crops. The land lies well for cultivation, and is easily tilled. Gypsum has been extensively applied on these soils, and with the aid of good cultivation, has rendered them very productive. It is to be hoped that the marls which exist abundantly in this region, will be applied as a substitute. The marl of the ponds and marshes is nearly a pure carbonate of lime. Another, a clay marl, may be found almost every where in tertiary formation, underlying the pebble and sand beds. It is the same as the clay used in the manufacture of bricks. It contains lime, and would be a good dressing on light soils.

TRAP ROCKS.

The general distribution of these rocks, and their position as overlying the red sandstone, and as cutting through its strata in dykes, have been mentioned. They vary much in mineralogical character, from coarse crystalline to a perfectly compact greenstone, and from a slaty clinkstone to a coarse amygdaloid. The steep escarpments along the shore of the Hudson present a rude columnar aspect, without having any regular columnar forms. These cliffs have long been called the Palissades—a name which most persons will acknowledge, is appropriate. Many facts of scientific interest were observed while examining these rocks. They will be detailed in the final report of the survey.

The soil overlying the trap rocks, where it is deep enough for cultivation, is rich and productive. The trap rock of the Palissades is extensively used in New-York as a docking stone, and for foundations. It is not quarried from the cliffs, but the masses that have tumbled from the cliffs above, and formed a slope of debris, are transported on slight rail-roads to vessels on the shore.

Jacob Voorhis has two of these quarries, from which he has shipped during the past season, about 100 sloop loads of 60 tons each, or 6,000 tons of stone.

Peter White has another near the two already mentioned, from which he has shipped this year 1,200 tons.

These localities are about two and a half miles north of Nyack.

The quantity shipped to New-York this year is only about one-fourth the usual quantity. The stone is sold at the quarries in cars, at 1s 3d per ton, and the boatmen roll the car to the vessel and empty it, and draw the car to the quarry again for another load. The stone sells in New-York for 4s per ton.

RED SANDSTONE.

The extent of this rock in Rockland county has been described. In colour, it varies from chocolate brown, through brick red and gray to white; in texture, it varies from pebbly conglomerate, through common sandstone, fissile and micaceous sandstone, to shale; and in composition, from perfectly silicious, to an argillo-calcareous marl. Where the trap-pean rocks have cut through these various strata, or have spread laterally between them, their texture and appearance are much modified, and appear to have been subjected to the action of heat, which has partially melted them, or rendered them more compact and hard, like a hard burnt brick, or has made them metalliferous.*

The useful varieties of this rock are the *gray* and *red conglomerate* sandstone, which is used for the hearths of iron furnaces, and the red sandstone or *freestone* so extensively used for door steps, the corners of buildings, and for the caps and sills of windows and doors, in brick buildings. Strata of *red argillo-calcareous marl*, *dove-coloured* and *reddish variegated limestone*, and a *reddish calcareous* conglomerate or pudding stone, are associated as subordinate strata; and as they are useful, they will be discussed in order.

Red and Gray Conglomerate.

This rock is found in almost every part of the sandstone region, and many quarries of it have been opened for the purpose of supplying fire stone for the hearths of iron furnaces. This stone is shipped to various parts of the country for this purpose, and no stone is known superior to it for durability.

Isaac Van Houten's quarry is one and one-fourth of a mile north of the New City. This quarry is the first that was worked for obtaining fur-

* Micaceous oxide of iron in small brilliant scales, is not uncommonly disseminated through these strata, near their junction with trap.

nace hearths, and was opened about fifty years ago. It has not been worked during the last thirty years until within a few months. Mr. Joseph Bird has reopened it, and pays Mr. Van Houten \$10 rent for every set of furnace hearths he quarries.* The quarry is two and a half miles from the landing, and a set of stones for a furnace hearth delivered there, is worth \$100. One stratum only is quarried for this purpose, and that is three feet thick. Another stratum above might be used, but it is stated to be too tender. This, and most of the quarries of sandstone were examined by Prof. Cassels. The stone is very porous, and filled with rounded quartz pebbles. It is tender when first quarried, but becomes harder by exposure to the weather. The furnace men prefer that the stones should "season" one year before they are put into the furnace.

Another quarry, owned by Mr. Cornelius Depew, is about half a mile north of Van Houten's. Here the stone is gray at the surface, but red two feet below, so that the blocks contain both colours. The stone is stronger, finer grained, and not so tender as Van Houten's, but in other respects similar. One stratum only is worked at this quarry. The grandson of Mr. Depew works this quarry, and pays \$15 rent per set of blocks for a hearth. The hearths now in the Greenwood, Woodbury, and Cold Spring furnaces, are from this quarry.

Blauvelt's quarry, three miles northwest of the New City, is worked by Isaac Springstein. It is opened near the summit of the hill. The face exposed is about 20 feet high. The uppermost layer is 5 feet thick. The stone is soft and friable, and is used for furnace hearths, glass works, and for jambs. The proprietor receives \$13.20 per set.

Another quarry has been opened three miles north of the New City by Richard Coe. It is the coarse gray sandstone, and near the junction of the trap and sandstone.

Another quarry, one-fourth of a mile west of Coe's quarry, has been opened by Levi Smith. This stone is also the gray sandstone from near its junction with the trap rock. A locality was observed on the shore two or two and a half miles below Haverstraw where the conglomerate looks like a good fire stone. The stratum is 4 or 5 feet thick.

Numerous quarries have been opened along the south base of the mountain on each side of the road, among which are those of John

* A common hearth requires 14 blocks of stone, 10 of which contain each about 20 cubic feet, and 4 each about 10 cubic feet, or in the whole, 240 cubic feet.

Red Sandstone or Freestone.

Gesner's quarry is at the ship yard, about half a mile below Nyack. It is not much worked.

Wilkin's quarry is one mile south of Nyack. 5,000 to 6,000 feet of slabs have been quarried here this year, and 500 cart loads of rubble stone.

The two quarries of Daniel Onderdonk and his brother are near each other below Nyack. 2,500 feet of slabs or flags have been quarried the past season from each.

Richard Clark's quarry is near Onderdonk's.

There are sixteen quarries in operation below, and fifteen above Nyack, within two miles from that place, which will average about 2,000 feet of slabs, (as Mr. Cassels was informed,) and 500 loads of rubble stones each, per annum.

This would give the product of the 31 quarries the last year as 62,000 feet of slabs, valued at..... \$9,300 00
and 15,500 cart loads of rubble, at..... 9,687 50
————— \$18,987 50

It was stated that the annual amount of sales a few years ago, was nearly twenty times as much, and this falling off in the business of quarrying, has been caused by the general stagnation of business, consequent upon the embarrassment of the currency. This stone is good for many purposes, but it is not as durable or strong as many others, and is being gradually replaced in the market by stones which are harder to dress, but which will endure the vicissitudes of our changeable climate for a longer time.

Red Marl.

This material is found in many places in the red sandstone region. It seems to be a variety of the sandstone formation, where the materials are so fine as to form a shale, and where it contains calcareous matter.

It was observed in abundance in the high, precipitous banks of the Minishecongong creek, in Haverstraw, two miles west of Grassy Point, near Capt. De Camp's house. It may be used as a marl, for which it seems well adapted. It is interstratified with sandstone, shale and gray compact limestone, but gradually crumbles by exposure to the weather.

Compact Gray Limestone.

Strata of this rock, of a gray or reddish or dove colour, are interstratified with the red sandstone, shale and marl. The beds are from 1 to 6 or 8 feet thick, and some of the layers are 2 feet thick, of perfectly compact homogeneous limestone, which is admirably adapted for a building material. It burns to good lime, and some of it would make beautiful dove coloured and reddish variegated marbles. Blocks of this stone of a suitable size for sawing can be easily procured.

RED CONGLOMERATE LIMESTONE.

This rock occurs at or near the junction of the red sandstone formation with the primitive rocks. It is composed mostly of pebbles and angular fragments of gray and black limestone, (like the adjacent primary limestone,) mixed with pebbles of quartz, granite, gneiss, hornblende, sienite, &c. and all are cemented together by a reddish argillo-calcareous paste, mixed with gravel and sand of the various materials mentioned. Although examination was made to discover localities where this rock could be wrought as a marble, none could be found which did not contain an admixture of some other rocks than limestone. It contains fragments of rocks harder than limestone, which would render it difficult to saw and polish. In its general aspect it is similar to the Poto-mac marble.

It was seen on the road side west of Stony Point along the ravine of Minishecongong creek, above Captain De Camp's, three or four miles southwest of Iadenton, and about half a mile west of Mechanicsville. It thus seems to skirt the northwest boundary of the sandstone formation in Rockland county, where it approaches the granitic and other rocks of the Highlands. A large block of this conglomerate is deposited in the geological rooms of the State collection in the capitol.

The *fossiliferous limestones* of Orange county at Mount Lookout, Tritite Mount, and Townsend's ore bed, with the *conglomerates, grits and shales* of Shawangunk and Bellevue mountains will be found described in Dr. Horton's description of Orange county, in the appendix to this report.

GRANITE.

This rock abounds in Rockland and Orange counties. It occurs in beds and veins, and in masses that are divided into layers several feet thick, and that might be called granitic gneiss, or thick bedded granite.

In the present report, the localities of economical interest as suitable locations for quarries* will be mentioned. Numerous locations for this purpose are known at distances greater or less from the Hudson, and will be mentioned in the final report, together with many localities of this rock of scientific interest.

In the present report, those of economical value on or near the banks of the Hudson, and convenient to water transport, will be mentioned. Many facts connected with the granite of Orange county, will be found in the descriptive geology of Orange county, by Dr. Horton, in the appendix to this report.

Local Details.

Granite and granitic gneiss, suitable for quarrying, occur at the foot of Butter Hill and of the Crow's Nest.

A granite quarry might be opened with advantage on the shore, about one mile south of Fort Montgomery, and east of Mrs. Pell's house.

Several quarries can be opened on Waggon's islands, between Fort Montgomery and Caldwell's Landing.

One or more quarries can be opened at the foot of the Dunderberg mountain, between Caldwell's Landing and Waggon's islands.

These quarries may all be opened directly on the shore, and blocks of large size may apparently be quarried with ease, and swung directly on board vessels by means of cranes. Should these stones prove as good as their external aspect would seem to indicate, it would be difficult to estimate their value, which would be very great.

A valuable quarry may be opened on Stony Point, a little west of the light-house. This part of Stony Point next the United States' land, belongs to Mr. Brewster. There are about 10 acres of granite of good quality, and which may be worked to a mean depth of 60 feet to high water mark. This place ought to be able to furnish one million cubic yards of granite, or 27,000,000 cubic feet. This rock is the proper granite, composed of quartz, feldspar and mica. It is darker or as dark coloured as the Quincy stone; is as durable, and as easily dressed. This quarry ought in the course of working to yield a nett profit of \$7,000,000, if the stone should prove as sound and easily quarried as its appearance would seem to indicate. The aggregate amount of workable granite in locations just described on the right bank of the Hudson in the Highlands, is estimated at 100,000,000 cubic yards, or 2,700,000,000 cubic feet, a quantity that may be considered inexhaustible.

GNEISS.

This rock is predominant in every part of the Highlands of Rockland and Orange counties. Its modifications have already been described, as well as its stratification, and allusion has been made to some of the transverse upheaves that have changed the dip and line of bearing, to a direction nearly perpendicular to the general ones.

This rock has been quarried in many places, but the quarries can scarcely be said to be fairly opened. Many fine locations for quarries exist which have not yet been opened.

Local Details.

Gneiss, and granitic gneiss, have been quarried from the loose blocks at the base of Butter Hill and of the Crow's Nest, on the shore. There is a great abundance of durable stone here, which can be easily obtained. It is rather hard to dress, but is beautiful and indestructible.

At West-Point two fine quarries of gneiss have been opened, and worked occasionally for many years. Most of the buildings at West-Point are constructed of stones from these quarries. They are of a

beautiful bluish gray colour. The quarries are about half a mile north of Fort Putnam.

A quarry has been opened at Block-House Point, about half a mile below West-Point, or three-fourths of a mile below Gee's Point.

Another quarry may be opened about one-fourth of a mile above Block-House Point, on the shore, northeast of the Hospital.

Another quarry has been opened on the shore, about half way between Block-House Point and Mrs. Kingsley's. Much of the rock along the shore to near Mrs. Kingsley's landing, may be quarried with advantage.

Cozzens' quarry is one-fourth of a mile below Mrs. Kingsley's.

A quarry has been wrought on the shore, about one-fourth of a mile above Buttermilk falls.

Another extensive one might be opened between that and Buttermilk falls.

Another quarry is at Buttermilk falls.

Mearn's quarry is half a mile below the falls.

Two other quarries are within one mile below the falls.

Faurot's quarries are half a mile and one mile below Consook island. Capt. F. has sold 1,200 tons of stone in New-York this year at \$1.75 per ton.

Another may be opened near Fort Montgomery.

Many other quarries might be opened along the shore at intermediate points, where the stone is of good quality; but much care is necessary in selecting judiciously, since a large portion of the mass of gneiss rock is not of a good quality. Little of the rock from Faurot's quarries to Mearn's quarry is good.

Several fine gneiss quarries might be opened on Waggon's islands, and between these and Caldwell's Landing.

TALCOSE SLATE.

This rock is seen on the shore of the Hudson, about one mile and a half or two miles below Caldwell's Landing. It passes on the west side of the limestone in which Tompkin's quarries are located, and crops out again in the bay beyond the first quarry, and is seen on the shore west

of the second quarry. It continues to bound the limestone on the west until it finally disappears below the red sandstone formation near Capt. DeCamp's, two miles west of Grassy Point. It is a continuation of the bed of talcose slate described in Westchester and Putnam counties, as ranging from Blue-Rock Point, at the mouth of Peekskill creek, through Gallows Hill, and so on into Putnam county. It is adapted for use as a fine stone for the in-walls of furnaces, but is applied to no use at present.

At the junction of this rock with the limestone at the south end of the Tompkins upper quarry, the rock is loaded with carbon and pyrites. The slate is glazed with films of anthracite, and was supposed to be anthracite coal. Statements were made in the papers of the discovery of a coal mine, and the owner is stated to have been offered \$5,000 for it but refused, in consequence of its supposed value.

Hornblende, Serpentine and Augite Rocks.

Hornblende rock forms the west part of Stony Point. It is intermixed with serpentine rock in some places, and in others it contains grains of magnetic oxide of iron. Diggings have been made here in search of iron ore, but no quantity of it has been found. Trap dykes cut through these rocks, and even penetrate the granite east of it, but not in such a way as to injure that rock for quarrying. Augite rocks occur in many places in Rockland and Orange counties, but it is not applied to any use. Black serpentine rock occurs near Forshee's mine in Orange county; it resembles that of Brown's quarry in Putnam county.

Limestone.

This rock occurs abundantly in Orange and Rockland counties. Those of Orange are highly important on account of their economical applications, and of much interest in consequence of the great number of beautifully crystallized and rare minerals that they contain. They are described in the descriptive geology of Orange county by Dr. Horton, in the appendix to this report.

The primary limestone of Rockland is not very extensive, but, from its location, it is of high economical importance. It skirts the shore of the Hudson for a mile or more, from the landing on the cove at the northwest point of Stony Point to a little north of Tompkins' most northern quarry. It extends thence to near Capt. De Camp's, two miles west of Grassy Point, where it disappears beneath the red sandstone

formation. It occupies an area of some 400 to 600 acres, and much of it lies near to the water.

This stone is now quarried extensively on the banks of the Hudson at Tompkins' quarries. Mr. Tompkins purchased 20 acres of this land on the shore of the Hudson two years ago for 100 dollars per acre, which was thought an extravagant price. It is a ledge of limestone rock 75 to 100 feet high above high water mark, with deep water along side, so that vessels are loaded with great ease. The stratum at the new quarry is from 300 to 500 feet thick, (measured across the strata,) from the shore to its junction with the talcose slate rock. Many thousand tons of this stone are shipped annually to New-Jersey, where it is burnt into lime with dust anthracite at a small expense. The lime is in part used as a stimulant manure in New-Jersey, and part is barrelled and sent to the New-York market. Each acre of this limestone ought to yield, in course of working down to water level, 600,000 barrels of lime, upon which a mean profit of 25 cents per barrel ought to be estimated. Most of this limestone is gray, but some is black and variegated, and might make a pretty marble.

The "marble quarry," as it is called, is on the banks of the Minishecongo creek, about two and a half miles west of Grassy Point. The most extravagant reports were circulated in relation to this quarry soon after its discovery.

The rock is composed of serpentine, chlorite, diallage, hornblende, limestone, and other substances, and is such a mixture of materials of different degrees of hardness that it could never be polished with advantage, even if it could be easily quarried.

A limestone quarry has been opened about three-fourths of a mile west of Capt. De Camp's, in Haverstraw, on land belonging to John Brooks. Much of the stone is white, granular, crystalline limestone, with thin tortuous black veins of the same material, and if good blocks of this character could be obtained it would make a beautiful marble. Specimens are deposited in the State collection. This stone is said to make a fine lime, and one or two kilns of it have been burnt.

Verd-antique.

This rock occurs in small quantities in various places in Rockland and Orange counties. Those in Orange will be described by Dr. Horton in the appendix to this report. One only of economical importance was observed in Rockland county. It was discovered by Prof. Cassels.

It is on the immediate shore of the Hudson river, about 1 or 1½ miles below Caldwell's Landing, and above Tompkins' quarries. Prof. Cassels describes it as four or five rods wide, measured across the strata, which are rather thick layers and blocks than strata. It is stated that blocks of any reasonable size can be quarried here, free from cracks and flaws. It is of various shades of colour, from a deep spotted green to a beautiful bluish white. It is generally free from pyrites, but some blocks contain crystals of this mineral. The occurrence of this mineral would injure it for sawing and polishing, but Mr. C. reports that most of the quarry is free from this mineral, and that the verd-antique marble from this place takes a high polish. The quarry is on the shore, and vessels can come directly along side. The quarry belongs to Sampson Marks, Esq.

Ores.

Silver ore is said to have been found in several places in Rockland and Orange counties, and many wonderful stories are told about the mines once discovered, and which the discoverers have not been able to find again. I have seen no silver ore or any thing to justify the conclusion that it exists there.

The same remarks may be applied to *lead ores*.

Copper ore is found in several localities in the trap and sandstone region of Rockland county. The strongest indications of copper ore were seen about two miles from Sadenton, by the road side, between that place and Ramapo works. Thin seams and scales of green carbonate and the red oxide, were seen in abundance on and through the trap rock. These minerals were first discovered in the loose masses of the rock, and were traced up to their source in the ledges of trap rock in the hill on the east side of the road. No veins of copper ore were seen, but veins of silicious matter one-fourth of an inch thick traversed the greenstone trap, and the sides of these veins were frequently invested with a thin scale of the ore. It is not improbable that workable veins of this ore may be found in this vicinity. It is well known that copper ore has been found in some quantity associated with sandstone and trap rocks like those in New-Jersey, Pennsylvania, Connecticut, Massachusetts, Nova Scotia, and on the shore of Lake Superior. Many mines have been opened in these various parts of the country, and considerable quantities of copper ore mined and sent to England to be smelted.

The arsenical ores of Orange county are discussed by Dr. Horton in the appendix to this report.

IRON ORE.

Magnetic oxide of iron ore abounds in the mountain region of Rockland and Orange counties. Most of the localities of this ore are on three or four lines which extend across these counties from northeast to southwest. Sometimes the lines are not continuous, but are dislocated by lateral heaves. Their continuity has not been traced throughout, and much time and minute observation would be necessary for a perfect development of these veins.

One of these veins ranges along the northwest faces of the Highlands, and the mines on Butter hill, Deer hill, and probably those of the Clove mine, O'Neil mine, and Forshee mine may be on this vein.

The other ranges from the Forest or Dean mine NNE to Kronkite's mine, Meek's mine, and the ore bed near West-Point. The ore beds on Constitution Island are believed to be a continuation of this vein.

The same vein is supposed to range from the Forest of Dean mine southwestwardly by the Greenwood mine, or else the Hassenclever mine, Patterson mine, Mountain mine, Long mine, Crossway mine, Sterling mine, and mine to the New-Jersey line.

Another range of ore seems to extend from the north side of the Crow's Nest, where a mine has been opened by Round pond and so on towards New-Jersey.

Another still probably ranges from Fort Montgomery by Queensbury mine, and Rich mine, to New-Jersey.

Local Details.

A bed of magnetic oxide of iron occurs about one or two hundred yards east of the reservoir at West-Point. Its quantity is not known, as no explorations have been made. The indications there are as promising as at many productive mines. The ore is associated with hornblende. It has been traced at short intervals for some distance in a southerly direction towards Meek's mine on the west part of Bear hill, southwest of Buttermilk falls.

At *Meek's mine* the ore is titaniferous.

Kronkite's mine on the farm of Richard Kronkite, Esq. is about half or three-fourths of a mile southeast of his house, and four and a half miles SSW of West-Point. There are two veins of ore separated by a sheet of rock. Mr. K. has traced it 50 to 80 rods to the NNE. 800

tons of ore were taken from this mine about thirty-five years ago, and it is said to have made iron of a superior quality. The ore is very rich, and the veins (separated by rock where they have been opened) vary from a few inches to 10 feet thick. They range NNE, and dip about 70° WNW. This place is three miles from Fort Montgomery. The Forest or Dean mine, and others on this vein are described by Dr. Horton in the appendix to this report.

A bed of titaniferous iron ore, much intermixed with a coarse granite or sienite, has been opened on the east side of Bear hill. It was not considered important.

The Round Pond mine was opened many years ago about one-fourth of a mile northwest of Round pond, and a considerable quantity of ore taken out, which appears very pure and a good forge ore.

Another opening was made a few years ago within 100 yards of the northeast part of Round pond, and several tons of ore taken out.

The Smith mine was opened in 1828, about one and a half miles south of Kronkite's landing, between the Crow's Nest and Butter hill. The ore is native magnet. The bed or vein is three or four feet thick and dips with the gneissoid rocks in which it is contained. It was worked by Mr. Smith of Fort Montgomery, who dug some tons of the ore. It has been abandoned for reasons unknown. The statistics of the iron mines of Orange will be found in the appendix where most of the mines are described. The ore is every where associated with gneiss, or granitic gneiss and hornblende.

In bringing this annual report to a close, I may be permitted to express the opinion, that although much has been done to develop valuable resources in the counties under examination, resources that were before unknown or not appreciated, yet, a beginning only has been made; the curiosity and interest of the people are excited; they have received eyes to see that an all-wise Creator has distributed the good things of the earth more equally than has been generally imagined, whether in the mountain or on the plain, amid sterile rocks or the most luxuriant soil, and all for the final benefit of man.

W. W. MATHER.

State Geologist, 1st District of New-York.

Jackson C. H., Jackson co. Ohio.

January 22d, 1839.

APPENDIX

TO THE

GEOLOGICAL REPORT OF THE FIRST DISTRICT.

Dr. William Horton, of Craigville, Orange county, New-York, who has for many years been an ardent cultivator of geology and mineralogy, and who has investigated with much care the geology and mineralogy of Orange county, has been engaged during the past season in developing its mineral resources, as one of the Assistant Geologists of the First District. He has collected and arranged in the cases of the State collection in the geological rooms of the First District, 2,888 specimens of minerals and rocks, to illustrate the geology and mineralogy of this county. Subjoined is a copy of his report on the geology of Orange county.

(B.)

REPORT

Of W. Horton, to W. W. Mather, on the Geology
of Orange county.

PRIMITIVE ROCKS.

The primitive region of Orange county extends from Butter hill, in the town of Cornwall, along the Hudson river to Fort Montgomery; thence along the line of Rockland county to the State of New-Jersey; thence along the New-Jersey line to the western base of the Pochunc mountain, about one mile southeast of the Walkill.

The northwestern border of the primitive is very irregular, extending obliquely across the county near its middle, in a direction about east and west. It embraces a large portion of the town of Warwick, most of the town of Monroe, the south corner of Goshen, part of Blooming-Grove, nearly all Cornwall, and parts of New-Windsor and Newburgh. By far the greatest part of this primitive region is composed of gneiss. In many places it is regularly stratified, the line of bearing being on an average south 45° to 50° west, and north 45° to 50° east; and the dip to the south and east at an angle varying from 45° to nearly vertical. There are, however, many variations, both in the direction and the dip, but they are local. This rock, in some of its varieties, forms the great mass of the Highlands. For exhibitions of the stratification and dip, many fine examples are seen on the Orange turnpike, and on the turnpike from Canterbury to the New-Jersey line. The local variations may be observed at Sterling mine, and on the road from Canterbury to West-Point, and many other places. It is presumed that the variations in the dip, to be seen on the last mentioned route, induced Prof. Eaton to believe that all the primitive rocks of the Highlands in this county dipped to the northwest.* *In general*, the primitive rocks of the county are less regular in stratification and dip along the banks of the Hudson, and at their western margin, than in their centre. Among the varieties of gneiss in the county, may be mentioned that in which the mica predominates, and that in which the feldspar predominates, as being most abundant; these occur every where. Next in abundance is that which is called hornblendic gneiss and gneissoid hornblende, the hornblende and mica forming the larger proportion of the rock. It is very abundant at Long and Sterling mines, and in all the short ridges and elevations forming the western border of the Highlands. Granite is abundant in the primitive region of the county, constituting beds and veins. It is coarse and crystalline, on the road from Buttermilk falls to Fort Montgomery, and on the turnpike from Monroe works to Haverstraw. It is graphic on Rocky hill in Warwick, and other places. It is sienitic in Mount Eve, at Sterling iron mine, and many other places. It is compact in Butter hill, fine grained and compact in many places on the road from Warwick to the Ramapo river. All the varieties of colour are abundant. The red is particularly so in several of the ridges east of Long pond. While it is not positively asserted that granite, in this county, is a rock regularly stratified like the gneiss, the careful attention of geologists is invited to a locality on the northeast side of the turnpike from Haverstraw to

* See Journal of Science, vol. , page

Monroe works, about three miles from the latter place; also to many places on the turnpike from the saw works to Bellvale, in Warwick.

Immense quantities of rock are found every where in the Highlands of Orange, which are neither perfect granite or gneiss, but partake of the character of both, or is intermediate between the two; and it is this *granitic* gneiss or *gneissoid* granite, which embraces a large number of the metalliferous deposits found in the county.

HORNBLENDE ROCK.

Extensive strata of this are found in the Highlands, which are well characterized. The most extensive one observed forms the middle of the southeastern face of the mountain first east of the valley of Long pond, in Warwick. This stratum is, perhaps, twenty-five rods wide. An extensive stratum also runs through the Forest of Dean, along the western margin of the white primitive limestone. Magnetic iron ore is associated with this stratum in many places.

In addition to what has already been remarked of the foregoing granitic rocks, it should be further stated that the feldspar is generally in a larger proportion than the quartz. The colour of the quartz is white and bluish, or reddish white. The mica is black, green or intermediate shades of these colours, and the feldspar white, yellow, red and greenish. The hornblende black, gray or greenish.

The minerals embraced in the foregoing rocks are numerous and important.

First are the ores of iron; all the magnetic oxides are found in them. They also contain adularia, fibrolite, kyanite, manganesian, garnet, serpentine, mica, plumbago, sphene, red oxide of titanium, crystallized hornblende, epidote, tremolite, zircon, crystallized augite, tourmaline, coccolite, sahlite.

Beds of other mineral substances are also embraced in the granitic rocks. In the town of Monroe is a bed of quartz. It is two and a half miles southeast of Greenwood furnace. Its northeast end only is visible. At this place it is four rods wide, and rises fifteen feet above the gneiss on each side. It is visible for more than twenty rods, and gradually disappears beneath the surface. The quartz is white and nearly opaque, containing in many places pale green coccolite.

Augite rocks exist in many localities; the surfaces are often covered with fine crystals. This may be seen at Greenwood furnace, Monroe,
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at the mica locality, near the Forshee mines, Monroe, at the Two ponds, Monroe, and numerous other localities. Hornblende in fine crystals at Sterling mines. Serpentine is found in connection with the iron ore at the O'Neil and Forshee mines. A large vein of this substance exists in Warwick, on the east side of Long pond; its breadth is unknown. It is exposed ten feet wide and fifteen feet deep; its colour is dark oil green, approaching black.

The foregoing rocks form the great body of the Highland mountains in the county. They also constitute the rock of many of the short isolated mountains, at a distance from the foot of the Highlands proper, on the northwestern side. Woodcock mountain, in Blooming-Grove, is formed of the granitic rock. It is a mile wide at its northeastern termination, and three miles long.

Round hill, in the same town, is another mountain of the same rock. It resembles very much a half sphere. Pedler hill, in the same town, is still another mountain of granitic rock. Goose pond, Sugar Loaf, Sugar Loaf Mate, Brimstone hill and Snake hill, are all primitive elevations in Goshen and Warwick, separate from the Highlands by intervening mountain ridges of transition and secondary rocks.

Mount Eve and Mount Adam, in the town of Warwick, near the Walkill, are also primitive mountains, formed of sienitic and gneissoid granite. Pochunk mountain, the most westerly primitive rock east of the Delaware river, has its origin on Pochunk neck, in Warwick, and passes into New-Jersey. Snake hill, in New-Windsor and Newburgh, stands like a primitive island, surrounded completely by transition rocks.

Four miles north of Newburgh, is a hill composed partly of the granitic rock. This hill is the farthest north and west of any primitive rock east of Shawangunk mountain.

Half a mile northwest of the village of Washingtonville, in Blooming-Grove, on the farm of Mr. Joseph Moffat, is the last and smallest primitive elevation in the county. It scarcely rises above the surface along the western margin of the limestone, and underlays only a few acres in extent.

All the primitive elevations last mentioned, have a line of bearing similar to the great Highland chain, and their dip is the same, and in the same direction, viz: to the southeast.

The general direction of the Highlands crossing this county, is nearly *east and west*, while the line of bearing of the *individual ridges* composing them, is about *southwest and northeast*. Thus, a ridge forming about the middle of the range on the Rockland line, gradually approaches the western margin of the mountains, until it emerges and forms a part of the northwestern margin of primitive country. Numerous ridges terminate thus in Warwick and Monroe, and do not re-appear north of the great sweep of the Ramapo.

A very striking feature in these Highland mountains, is the absence of long continuous ridges; of these, there are *none*. They are all broken up into short abrupt hills, many of them 1,000 and 1,200 feet high.

Another striking feature is, that the southern terminations of these ridges are very generally abrupt, many of them perpendicular naked cliffs, having the appearance of being broken off, while the northern terminations are gradual, and slope gently to the surface, and disappear.

Butter hill and Woodcock mountains are exceptions to the above appearances: but even Butter hill, steep as it is, has not the ragged broken appearance which many southern terminations exhibit.

WHITE LIMESTONE, PRIMITIVE OR GRANULAR LIME ROCK.

This rock has a distribution of some extent in the county. Beginning on the Hudson river, it is first observed half a mile northwest of Fort Montgomery. It is here several rods in width, and can be traced two miles northeast from the line of Rockland county. It here lies confusedly, the stratification indistinct, rising into short and broken ledges; it is white, and every where full of plumbago, pyrites of iron, boltonite and serpentine, so much so, that it can scarcely be recognized as a white stone. It is, wherever noticed in this vicinity, small, crystalline, and very hard for this rock; this stratum or bed takes the direction of the granitic rocks, in which it is embraced, the line of bearing being northwest and southeast nearly.

Proceeding from this point, directly northwest, six or seven miles along the gorge through which Fort Montgomery creek reaches the Hudson, we reach another BED of this rock. This point is a few rods northwest of the Forest of Dean mine. Here this rock, interstratified with the granitic and hornblende rocks, occupies a breadth of nearly or quite a mile, being wider than where seen at any other place.

From this point, it may be traced northeast by the way of Little Round pond, northeast corner of Bog Meadow pond, southwest by the way of Popelo's pond, and the brook from the Two ponds to Greenwood furnace; thence, with some interruption where it crosses the Ramapo, by the east side of Duck Cedar pond, to the New-Jersey line.

In all this extent, it frequently disappears and again reappears, after having apparently been cut off by the granitic rocks. It is seen in some places only a rod, or even less, in breadth. In many places it is seen in contact with the granite, the gneiss and hornblende rock; sometimes *between* them, sometimes *above* them, and sometimes *beneath* them. It is *not* stratified; in all this extent, which is about twenty miles in a straight line, it is confined between certain limits, and never appearing northwest or southeast of given lines, which may be about a mile distant from each other. It is generally quite narrow, and occasionally it is *cavernous*. Its bearing is southwest and northeast. Its prevailing colours are white and red; much of the red is flesh red, and coarsely crystalline, forming a handsome calcareous spar. It every where contains imbedded minerals; those which particularly distinguish it in almost every locality, are what is believed to be the boltonite of Shepard, and small black spinells. What I suppose to be boltonite, has hitherto been called brucite, which it resembles in some respects. The Mineralogist of the Survey will determine to which species it belongs. This rock also contains beautiful pargasite, sahlite and coccolite; also crystallized augite, scapolite, zircon and sphene; also serpentine and plumbago.

A few trap dykes are seen cutting obliquely across this rock, one of them is partially exposed at the Two ponds in Monroe, and contains imbedded crystals of hornblende.

Three others are visible at the Duck Cedar pond, one of them finely exposed. It is here seen cutting the limestone precipice perpendicularly downwards fifty feet, and running nearly east and west. The trap rock is perfect green stone. A few rods from the southwest end of Popelo's pond where the stream enters it, this rock forms a perfect natural bridge. It is used as such, and one might cross it without being aware, unless the noise of the brook aroused his attention. The breadth of this bridge across the stream is fifty feet, and its length up and down the stream seventy-five or eighty feet. Hornblende rock supports the arch on one side, the other is covered by soil, but it is believed to be granite. This space is spanned by the lime rock. The water, at present,

fills the concavity below so that I could not see through; but in times of drought, people pass through it.

This limestone is also met with half a mile southwest of the Queensborough forge, very much resembling that at Fort Montgomery, and containing the same substances imbedded in it. It is here of very limited extent, being confined to a few small elevations of a few rods in extent.

White primitive limestone is also found in the town of Warwick. It exists here on a more extensive scale. Its northern limit is near the line of the town of Goshen. It passes along the east side of Mount Eve. Its southeastern limit is very straight and well defined until it enters New-Jersey. Its western is irregular, passing along the side of Pochunck mountain, thence near the margin of the Drowned lands across the Pochunck creek to Mount Adam. It also passes some distance between Mounts Adam and Eve. At its widest part its extent is more than three miles. It contains every where beds of granite, quartz, hornblende rock and augite rock. It is not stratified, or if so, it is very irregular and confused. True, there are localities where there are appearances of stratification, and a dip to the southeast, but they are very limited in extent.

Its colour is generally white, having the character of calcareous spar. In some localities it is snow white, translucent and compact like Parian marble. Plumbago and mica are very generally disseminated through it. It also contains a great variety of fine minerals imbedded, which will be enumerated in another place. It does not rise into ridges of much elevation.

TRANSITION ARGILLITE.

This rock occupies a large extent of surface in this county. Its general direction is NNE and SSW, varying to northeast and southwest. Some ridges and elevations differ considerably from this course; but these are partial, and extend only short distances. Its colour differs from light ash grey through all shades to black. Its hardness, in some localities, being the softest kind of clay slate; in others, hard and silicious; while others still possess this property in all intermediate degrees. It is every where regularly *stratified*, although the strata, in many places, are singularly bent and contorted.

Its *dip* is uniformly to the southeast, differing considerably in its amount in different places. In some localities its position is nearly ver-

tical, while in others, the angle of its dip will scarcely reach 30° . Perhaps the angle of 50° will be nearest that of its general dip. A little way from the western base of the Highlands, it extends from near the line of New-Jersey in the town of Warwick, uninterruptedly to the Hudson river in Cornwall, New-Windsor, and Newburgh. On the west side of the Walkill river, the same rock comes out of New-Jersey and passes down this stream until it enters Ulster county, and in all this course there is no rock resting upon it.

With the exception of the two ranges mentioned above, it is often overlaid by other rocks; these will be noticed hereafter. It forms the bank of the Hudson, from about three and a half miles above Newburgh, to Cornwall landing, which may be about nine miles. Wherever this rock is seen in this county, it is more or less stratified with graywacke and graywacke slate.

Fine opportunities for observing these alternations, are afforded in the town of Montgomery, at the village of Walden, in the bed and banks of the Walkill, and the banks of the aqueduct which supplies water to the factories; also in the quarries on the west bank of the stream opposite the factories; also in the bed and banks of the Walkill, a little below the village of Montgomery; also in Mount-Hope at and near the village; at Unionville in Minisink, near the New-Jersey line; in the banks of the Hudson at Newburgh, and on the road from Newburgh to Hampton, about a mile from the former place.

On the whole, the alternations of the graywacke are less frequent and less extensive on the east and southeast side of the Walkill, than on the west and southwest. As we approach the foot and ascend the southeastern face of the Shawangunk mountain, the graywacke *covers more surface* than the argillite.

This rock forms a kind of cuneiform termination in Warwick, about half a mile from the New-Jersey line; the limestone meeting round this termination from both sides. From this point, proceeding northeast, the argillite widens into an elevated ridge of rich land, called Long ridge, which extends across this town into Goshen. It forms the surface rock over three-quarters of Goshen; nearly all Blooming-Grove, west of the mountains; parts of Cornwall and New-Windsor; a large part of Newburgh; all Montgomery; all Hamptonburgh, except two or three farms; most of the towns of Crawford and Walkill; part of the town of Mount-Hope, and most of Minisink.

It rises almost to the top of the Shawangunk mountain, the whole breadth of the county at that part.

The stratification of the argillite is finely exposed at the quarries of Mr. Bulmer, half a mile from the village of Sugar Loaf. The bent and contorted appearance is seen to advantage in the bank of the road, two miles north of Goshen. The contents of this extensive rock are not very numerous or interesting. In a few places it embraces *beds* of quartz. Those in the town of Warwick, are the largest I have seen. Some of them may be seen on a cross-road from Bellvale to Thompson's pond. In dip, and direction, they coincide with the argillite, in which they are embraced. Some of them are ten and twenty feet thick. The length could not be ascertained on account of the soil. The quartz of the beds is granular, columnar and crystallized. Crystals are not fine. Seams of argillite and chlorite run through the quartz, and the cavities in the quartz are often lined with a black powdery substance, which is supposed to be manganese in the state of black oxide. Veins of quartz also frequently traverse the argillite. These veins are irregular in their direction, and do not preserve any uniformity in their breadth. The quartz with which they are filled, is precisely similar to that found in the beds just described. Sulphuret of iron, in narrow veins and nests is occasionally seen in this rock. Sulphuret of lead and sulphuret of silver are said to have been found in the argillite of this county; but I have seen none, and presume their supposed discovery has been owing to mistake.

Small veins of fibrous carbonate of lime, having the form and appearance of satin spar, have occasionally been found. Where I have seen them, they are generally in the vicinity of the veins of quartz. A kind of carbonaceous matter coats the seams of the argillite, in a few localities. Tolerable specimens can be obtained at the quarry at the village of Sugar Loaf. In very many places in the county, this rock is loaded with carbon, so much so as to deceive the inexperienced eye into the belief that it is coal; hence the very common belief among us that coal in abundance will yet be found in the county. Mining for coal, in a small way, has been undertaken in several places, and the rock has been penetrated, by boring for this purpose, more than 200 feet. These undertakings have all resulted in loss, and in a few cases, to a ruinous extent. They tend, however, to reveal the true character of the rock, and to show us how small a probability exists of discovering extensive beds of coal in this formation.

True it is, however, that carbon is abundantly diffused through this argillite, and that thin seams of anthracite can be exhibited in many places.

Anthracite is also disseminated in the graywacke in masses from the size of a pin head to that of a pea, so as to give the rock quite a handsome appearance. This is strikingly the case at Walden, on the north-west bank of the Walkill.

The argillite, and its associated graywacke and graywacke slate, nowhere rise into lofty mountains. When this circumstance is recollected and taken in connection with what has been stated of the extent of this rock forming the great valley of the Walkill, it will be perceived at once how greatly it modifies the surface of the country. There is another remark should be made in this place, in relation to the rock of which we have been speaking. The argillite portion of the county of Orange embraces an unusual *number* and extent of swamps, or as they are called, bog meadows. They are *all* formed by bars of argillite rock across their outlets; this is true from the great drowned lands down to those which cover only an acre or two of surface. *The useful* purposes to which this rock is applied, are not numerous. The most important one at present, is in the construction of fire places and the lining of furnaces. When placed with the edges of the laminæ to the fire, it remains for a long time uninjured. Some varieties in this county, which are not silicious, are excelled by no stone, for this purpose. The quarries of Mr. Bulmer, at Sugar Loaf, furnish excellent stone in abundance; they are sold at from \$2 to \$5 per load, at the quarry. It is also quarried to some extent on the western shore of Big Long pond, as a fire stone. Roof slate might be obtained abundantly, very similar to the Welch slate, but none is wrought for this purpose.

The argillite is also employed to some extent in the construction and repair of roads; it is, however, but a poor material for this purpose. The surface edges of the rock are generally employed, and these of the variety containing the largest proportion of clay. The wheels soon reduce it to powder so fine that the wind drifts it when dry, and the water washes it away when wet.

Beds of silicious slate and Lydian stone are embraced in this argillite. I have also seen graphic slate, but it is not abundant. In some places, the graywacke associated with the argillite forms a tolerably good building stone. It quarries very well, and works well under the hammer, but it requires great experience in selecting the layers, to avoid those

which crack and crumble to pieces when exposed to the weather; this tendency renders it unsafe for masonry of importance. It is employed to great extent in the construction of field walls; a large portion of the county is enclosed by walls of this stone.

GRAYWACKE.

This rock has the widest distribution of any in the county. It occupies all the town of Deerpark, laying northwest of the Basher's kill. In this region, it assumes all the various forms usually called by this name, including the wacke slate. In some of the ridges of mountains, it is in thick massive layers, dark coloured and compact. In others, it is in layers of but a few inches in thickness, light gray colour, very hard and sonorous, when a blow of the hammer is applied. In others, still, it is soft; colour, dark and dull, with a strong tendency to decomposition; and finally it passes into wacke slate, which is sometimes the colour of the rock, and at others nearly brick red. Between the Neversink and Mongaup rivers, the redwacke runs nearly across the town. The direction of the mountain ridges in this section of the county, coincide very nearly with most others to the east, that is, northeast and southwest nearly. There are, however, some variations. Some of the strata lay quite flat, approaching a horizontal position; others are much more inclined. The general angle of dip may be included between 15° and 25° to the northwest and north. The Delaware river occasionally runs a short distance between these ridges, but generally crosses them obliquely. At low water, the hardest layers of the rock may be seen in many places forming a reef across the stream. From a little below the mouth of the Mongaup, the Delaware takes the direction of the strata for near three miles before it finds an exit to the south and east. In this distance, the mountain attains an elevation of 800 or 1,000 feet; in some places, it is almost perpendicular. Here nearly all varieties of this rock may be seen, except the red. Most of these three miles, the Delaware and Hudson canal is built in the river, the mountain forming one bank, and a wall of stone from fifteen to twenty-five feet high, on which is the tow-path, forming the other bank. The strata of graywacke extend from the Delaware river into Sullivan county. In this stratum, west of the Shawangunk mountain, I have not been able to detect a single fossil in place, although faint arborescent appearances are discoverable on the surfaces of some layers. The Shawangunk mountain extends in a single unbroken ridge from the New-Jersey line to Sullivan county. Near or at the summit of this ridge, the graywacke appears again, but here its position, at first nearly ver-

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tical, as we descend to the southeast, soon becomes reversed, that is, while its direction continues the same, its dip is to the southeast, at an angle varying from 45° to 90° . Here it is occasionally interstratified with the argillite. As we proceed southeasterly, before we reach the Walkill, the argillite becomes the predominating rock. Over this space, viz: from Shawangunk mountain to the Walkill river, this rock, with the alternating argillite, extends unbroken from New-Jersey to Ulster county. Over the remainder of the county, until we reach the primitive region of the Highlands, it every where accompanies the argillite, and is interstratified with it. It is the first rock next the primitive. It is found in several valleys between the western ranges of the primitive, and even mounts some distance up their sides, particularly the western.

Bellvale mountain extends quite across the town of Warwick. The southeast side, the top, and about one-third of the descent on the northwest side, are composed of graywacke and graywacke slate, standing nearly vertical. Its colours are gray, greenish and bluish gray, and brick red. Many of the layers are completely chequered by veins of milky quartz traversing them in all directions. While it passes on one hand into graywacke slate, or graywacke shale, on the other it becomes a perfect conglomerate.

Skunemunk is similar to Bellvale mountain, passing unbroken nearly across Monroe. Its southeast side, top, and part of northwest side are graywacke in all the same varieties. It is not in a line with Bellvale mountain, neither do their lines of bearing quite coincide. Most of this mountain has the dip, &c. of Bellvale mountain; but *High point* has the rock dipping to the *east*, and some part of it even to the *north-east*.

On some of the small ridges northeast of Bellvale mountain, the graywacke is seen forming their northwestern sides, while the opposite or southeast side is primitive rock. One of these may be seen a mile west of the Friends' meeting-house, in Monroe. In these cases the line of bearing and dip of the graywacke coincide with those of the primitive, and the graywacke has the appearance of passing beneath the primitive rock. At the western base of Goosepond mountain and of Sugar Loaf Mate, the slate has the same position in reference to the primitive, and exhibits precisely the same appearances. These circumstances being precisely similar are mentioned together, so that future visitors to the neighborhood may notice both. In many places both rocks are visible but a few feet apart, but I have not seen them in actual contact. This position of the two rocks so different in age, is singular

and interesting. In the banks of the stream from the village of Canterbury to the Hudson, nearly all colours and forms of graywacke may be seen. Also in the banks of the Hudson, from Cornwall landing a mile up the river to the mouth of the creek. *Pine hill* east of Skunemunk is a graywacke ridge, composed almost entirely of the red, slaty, compact and conglomerate forms. Woodbury furnace is built from the red stone of this hill. It makes an excellent building material, and resembles in all respects sandstone.

Fine quarries of the blue flagging stone might be opened in Skunemunk mountain, and of the red, resembling the sandstone, in *Pine hill*.

LIMESTONES.

Limestones, or as they are called in many parts of the county, blue limestones, of these there are several. The oldest, and that which occupies the lowest position geologically, is the sparry lime rock, or chequered rock.

A stratum of this rock commences on the bank of the Hudson at Hampton, where Orange is bounded by Ulster county. It is about one mile in width from northwest to southeast. Its direction is very nearly SSW, passing about a mile northwest of the village of Newburgh, into the town of New-Windsor, and disappears beneath the surface finally, in the vicinity of a small body of water called Little pond, in the latter town. With the exception of one locality, its dip is to the southeast at an angle of 30° to 60° . The exception referred to is at Hampton, on the bank of the river; here this rock attains an elevation greater than at any other point in this stratum, and the oblique ends of the layers as they come out to the river bank, appear as if they had been elevated into a position which gives them a dip of 30° to 40° to the west and northwest. The elevated point of this rock at Hampton, and a similar but less elevated one a little below, called the form the northern termination of the long bay of Newburgh.

Many of the layers of which this stratum is composed are from two to four feet thick; they are solid, compact, and some of them breaking with a perfect conchoidal fracture. The layers differ considerably in colour, part being a very light and part a very dark gray, and both traversed in all directions by narrow seams and veins of white calcareous spar. Occasionally nests of quartz crystals and brown spar are noticed. I have not discovered a fossil in this rock, nor could I learn that any have been seen by others. In a quarry of this rock belonging to Mr. Charles Collier, the surfaces of the layers are covered with a

very white incrustation, which forms handsome specimens. It has the appearance and hardness of arragonite. Veins of white quartz and nodules of black hornstone are common in some of the layers. This stratum is employed extensively for burning into lime.

Another stratum of sparry lime rock, farther to the south and east makes its appearance about a mile east of Salisbury mills, in Cornwall.

It is here but a few rods in width, and not far distant from Skunemunk mountain. It is visible, with a few interruptions, across Blooming-Grove and Warwick, to the State of New-Jersey. It is seldom more than a mile in width. It resembles closely the stratum near Newburgh, but at no point rises so high above the surface. In the village of Warwick, it affords good specimens of crystallized quartz, and crystallized brown spar. Fifty or sixty rods west of the Presbyterian church, in the same village, some of the layers are a light red colour, very close and compact in structure, and gives the argillaceous odour when moistened. The lustre is quite dull, and it breaks with a flat conchoidal fracture. There is evidently much clay in the composition. It has been supposed to be the water lime, but there are more glimmering particles in it than in the hydraulic lime of standard localities. It has also been examined in reference to its fitness for a lithographic stone, but does not prove good. It is called red marl in that vicinity.

The minerals noticed in this rock, are quartz crystals, crystals of brown spar, crystals of oxide of titanium, and magnetic iron ore, so strong as to have given it the name of native magnet.

In Hamptonburgh, limestone exists as a bed in the argillite. This bed is about two and a half miles long, and fifty or sixty rods in breadth. The contact of the two rocks is no where visible, although they are within a few rods, and in some places but a few feet distant. This bed has the same direction and inclination as the argillite. It is all fetid, and contains cubic crystals of sulphuret of iron, which are of a bright yellow colour. Most of the layers are the usual colour of sparry lime rock; some however are very dark coloured, so much so that it was supposed to contain coal; an excavation was accordingly made for this mineral; it need scarcely be observed that no coal was found. The surfaces of some layers are full of the fossil shells of the very early periods of animal life. The stone of this bed has been long used for lime, but the quality is not very good. The argillite closes round both ends of this bed. It is called the Neelytown limestone in the neighborhood where it lies. Limestone exists abundantly in the town of Monroe,

particularly in the north and northwest part of it. It is abundant about two miles north of Greenwood furnace, near the point where the Ramapo river enters the Highlands. It is here spread out to a breadth of near two miles, and a part of it extends southwesterly to the neighborhood of Long pond.

It is much used as a flux in the iron furnaces, and but very little for lime.

A small bed of similar limestone is found in the town of Cornwall, half a mile southwest of Ketcham's mill. It is stratified and dips to the southeast. Limestone is also found in great abundance in Goshen. It begins two and a half miles southwest of the village, and extends from the Walkill southeast to Thompson's pond, a breadth of six or seven miles, and in length to the south and west, it extends into New-Jersey, across the town of Warwick, west of the stratum already mentioned. The western edge of this limestone underlays the drowned lands and most of the islands in them, and passes along the northwestern margin of the white primitive limestone of Warwick. Another part of the same rock passes along the whole southeastern margin of the same primitive limestone, and crosses the line of New-Jersey with it; in other words, when this limestone meets the primitive rock, it divides into two branches; one proceeding along the northwestern, and the other along the southeastern margin of the primitive until they all enter New-Jersey. I have not seen them in contact, but they are every where in close proximity; no other rock intervening. At the line of New-Jersey, this rock, with the included primitive, occupies a breadth of nearly eight miles. The northern terminations of the ridges of this limestone interlock with the southern terminations of the argillite ridges. This singular interlocking of the two rocks can be finely seen three and a half miles from Goshen, and a half a mile southeast from Mapes' tavern; also, a little farther southeast, at the limekiln of Mr. H. W. Thompson. I have been able to detect no fossils in this limestone, except near the limekiln first mentioned, and these are in the upper layers, associated with the conglomerate limestone on the land of Mr. Thompson. The pebbles, of which the conglomerate is composed, are all smooth and apparently water-worn; all sizes, from that of a pea to several pounds weight; all shades; of light-gray to dark-brown, and nearly black, firmly cemented, and all burn into excellent lime. The dip is here to the southeast from 3° to 10° .

A mile west of this is a lofty hill called Mount Lookout. It is composed entirely of limestone; its southern, western and northwestern

boundary is a circular wall of limestone, about perpendicular, and at a distance having quite the appearance of trap-rock. It lies in a position nearly horizontal, having but a very slight inclination to the west. In this neighborhood the limerock abounds in hornstone, generally black. When the western branch of this limestone reaches Great island in the drowned lands, its dip is to the northwest, and so continues to New-Jersey. The eastern preserves throughout, its usual positions. A small portion of this limestone is found in Minisink, on the west side of the drowned lands. This occurs at a point where the Walkill makes a considerable curve to the east.

On Big island, in the drowned lands, some of the layers of this rock are oolitic, in several places near the village of Warwick; also half a mile north of New-Milford.

On Pochunc neck, about three miles from the New-Jersey line, some of the layers differ from any seen in the county. In some of the perpendicular cliffs, the edges of many layers are exposed, naked, one above another; some of these are of the usual character, others are oolitic; but the round granules are bluish white quartz; other layers still are slaty, approaching the calciferous slate; some of it has a ribbonlike appearance; the laminæ of light and dark-gray alternating in the layer. A locality, nearly similar, may be seen at Bellvale, on the land of Mr. Wilson. At this place some of the layers contain but little lime, and approximate closely in appearance the calciferous sand-rock of Prof. Eaton.

The lime rocks of a later formation, which are found in the county of Orange, remain to be noticed. In the town of Deerpark a stratum exists, which extends from the New-Jersey line to the county of Sullivan. It reposes unconformably upon the mill-stone grit at the western base of the Shawangunk mountain; its position is almost vertical, the dip to the southeast; some layers of this stratum appear to be almost composed of shells, in others they are less numerous. Among the contents are two species of trilobite, the orthoceratite, terebratula, &c. Some layers of this rock appear to be a slaty calciferous graywacke, and some are impure limestone, hard and compact, as well as slaty.

These rocks, as a whole, form a narrow range of hills, or low mountains, sometimes sinking almost to the level of the Neversink valley, and at others rising to one-third or half the elevation of the Shawangunk. They are always narrow, and generally close to the base of the

last named mountain. The rising and subsiding of the tops of this ridge affords one of the most prominent features of this valley, and adds greatly to its picturesque beauty.

I have said that these lime rocks repose unconformably on the grit-rock composing the Shawangunk mountain, that is, dipping southeast, while the grit dips northwest; this, however, is far from certain. The stratification is to me still uncertain; this much may now be stated as fact in this county. If the rock dips north and west, the slaty laminæ cleave at about right angles to the dip. These rocks require further observation up and down the valley, to settle their position.

Carpenter's point, between the Delaware and Neversink rivers, is composed of a dark coloured, impure limestone, apparently dipping to the north and west, running a little southeast of Port Jervis; it composes a part of the ridge last described. There are none of the limestones in this valley which burn into good lime.

A limestone, containing abundance of fossils, is found in the town of Cornwall, two and a half miles west of the village of Canterbury, on the road to Salisbury mills. Its apparent position is between the slate and grit-rock, or millstone-grit of Prof. Eaton. Its dip is to the southeast, at a high inclination. Mixed in between the layers of this rock is the hematite, or limonite ore, on the land of Mr. Thomas Townsend. Where the ore exists, the limestone is all more or less decomposed, some parts of the rock and its fossils retaining their form, but have become white or yellow, and soft, other parts, even the nodules of hornstone, are so far changed that they have fallen to fine powder, mixed up with the ore in the same condition. This limestone makes but indifferent lime. The distinctive fossil of this rock is the encrinite, although it contains many others. Limestone also is seen connected with limonite, a quarter of a mile north of the Clove mine, in Monroe. But little of the limestone, or ore, is exposed; not sufficient to reveal their position or relations.

On the whole, our blue limestone formation is abundant for useful purposes, and conveniently distributed. It is found in Newburgh, New-Windsor, Cornwall, Monroe, Blooming-Grove, Hamptonburgh, Goshen, Warwick, Minisink and Deerpark. That of Cornwall* and Deerpark, where observed, does not burn, and perhaps cannot be burnt into very good quick lime, but in all the other towns mentioned, the stone is pre-

* This remark is not intended to include the bed near Ketcham's mill or the white primitive limestone.

cisely similar to that from which so much and such superior lime is burned in Newburgh. All that is required are care and experience in selecting and burning. This statement is necessary since the belief has become common, that there is little if any good limestone in the county, except at Newburgh, and as a consequence, the Newburgh lime has comparatively excluded all other from use.

It is a common belief in the county, that the limestone from beneath the surface requires less fuel to reduce it to lime than that taken from the surface.

As a building material, some of our limestones are not surpassed by any found in the State. Those of Neelytown in Hamptonburgh, and Mount Lookout in Goshen, are peculiarly fine. That of Mount Lookout is a handsome dove colour, and perfectly durable. It can readily be obtained of any length and thickness required.

MILLSTONE GRIT, (*of Eaton.*)

All the northwestern side of the Shawangunk mountain is composed of this rock. It is regularly stratified. The line of bearing being about north 50° east, or south 50° west. The dip to the northwest, at an angle of 30° . This rock extends, without interruption, from the New-Jersey line to Sullivan county, and from the base of the Shawangunk* mountain to the top; in some places it caps the top of the mountain, and in others the slate of the eastern side is the highest. I have not seen the two rocks in actual contact, although they are close to each other the whole length of the county.

The structure and composition of this rock varies in different layers from fine grained, nearly compact, to that which is composed of pebbles the size of filberts. Most of the layers are very hard, some are sandy, and others even slaty. Its colours are white, gray, grayish and reddish white, and brick red.

About one-third of the distance from the bottom of the mountain is a belt of the red coloured rock; it is about two rods wide, the layers corresponding with the layers of the other colours, and it extends quite across the country. In many places hard specimens could not be distinguished from the New-Jersey sandstone.

* Shawangunk, pronounced by the Indians Shong-gum, meaning white stone, is very appropriate. People now living, have had this explanation from the lips of the Indians.

The same rock is found in the town of Blooming-Grove, but in a different situation and position. It is first found in this town on the southeast side of the Round hill.

Round hill, like the Highland ranges, is primitive, and here the grit rock inclines against and rests upon it. The grit rock is regularly stratified, line of bearing same as in Shawangunk mountain, but it dips to southeast. It passes through all kinds of composition, from compact to soft and slaty on one hand to a coarse conglomerate on the other; and all shades of colour, from milk white to brick red. From the point mentioned, it extends northeast nearly four miles, until intercepted in its line of bearing by a part of Woodcock mountain, which is primitive.

A similar rock is again found in the southeastern face of Skunemunk mountain, and at its base. But here it is interstratified with the graywacke and graywacke slate, and while all the colours already mentioned exist here also, there are some layers which are different. The pebbles of which these layers are composed are much larger, and about half of them are very white, and the remainder very red. All the pebbles are smooth, as if water worn.

These layers extend as far south as Skunemunk mountain, and about two miles farther north than the mountain itself does. The Hematite mine of Mr. Thomas Townsend, is connected with this rock, two and a half miles west of Canterbury.

Pine hill, a ridge next southeast of Skunemunk, is composed of this rock; it is near three miles long, narrow, and somewhat elevated. In this hill the rock is almost entirely red, and can be quarried in handsome blocks for building. Woodbury furnace is built of stone from Pine hill; it has all the appearance of freestone, except that it is rather more variegated than most American sandstones. It bears a high temperature very well. No fossils have been seen in this rock any where.

CLAYS.

Kaolin is found in a few places in the Highlands. One locality, a mile north of Southfield furnace, on the Orange turnpike, affords indications of its existence in some quantity. It has not been tested as to its value in the manufacture of Porcelain.

The blue and gray clays form an extensive stratum, underlaying the soil over a large portion of the county, particularly all that portion

underlaid by the graywacke and slate rocks. These clays are all more or less marly, that is, contain lime in their composition. Some of the blue clays contain so much lime as to injure them for the purposes of making brick; clays of this description are manures of great value for sandy soils, by supplying directly the two substances most valuable on such soils, viz: clay and lime. There is no reason to doubt that these beds of marly clay will at a future day be extensively employed as manure. Their extensive distribution, and nearness to the surface, renders their use peculiarly convenient and cheap.

These clays also furnish an inexhaustible supply of material for the manufacture of brick. Some of our clays have thin layers of fine sand between the layers of clay, thus affording the materials for brick without mixture.

From these clays there have been made the present season, bricks to the following amount:

In Cornwall, F. Clark,.....	1,260,000
do W. Stringham,	1,000,000
do N. Audams,	3,000,000
Walkill, M. L. Sproat,.....	300,000
Goshen, S. C. Wood,.....	300,000
Newburgh, Norris,	2,100,000
do Anderson,	300,000
	<hr/>
	8,260,000
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These, at the average price of \$5.50 per thousand, give \$45,440, as the income of the county for one year, from our clays.

This sum, however, is not a fair average product. There are some places not included in the above estimate, where bricks are burned occasionally, but not as a steady business; and at the places above enumerated, less than usual have been made on account of the stagnation of business, the last two summers.

IMPROVEMENT OF THE SOIL—MANURES.

From the peculiar situation of this county, bordering on New-Jersey and Pennsylvania, and from its water transport being by the Hudson river and by the Delaware and Hudson canal, it is impossible to ascertain, with any thing like accuracy, the amount of plaster of Paris consumed annually in the county; enough, however, is ascertained to ac-

quaint our agriculturists with the amount of its cost, and to admonish them to look among their own resources for mineral manures. During the present season, exclusive of that sent up the Delaware and Hudson canal, there have been sold in the county 5,200 tons of plaster in the stone, at the average price of \$5.50 per ton; to this must be added \$2.50 per ton for grinding and transport, and we have the sum of \$41,600 as the annual amount paid by the farmers of the county for mineral manure.

A great part of this sum might be retained in the county, if farmers would turn their attention to their own mineral resources. Their limestones, marls and bog earth, or vegetable matter of our bogs and swamps, and marly clay, furnish inexhaustible supplies of the best manure, adapted to all kinds of soil and culture.

Marl exists in almost and perhaps every town in the county, and every land-holder can soon ascertain whether he has it upon his land, without the cost of a dollar; for in this county it lies *naked*, or covered by water, or bog earth and peat. He has only to open a space a foot or two square with a spade, through the black earth, and if it exist, it will be found at the bottom. It has not been much used as a manure up to this period. The few trials made have generally been unfavorable, and from the very circumstance of all others which should have recommended its continuance. Marl, where the trials have been made, was so cheap, and so easily got and put on the land, that too great a quantity was used, and all vegetation thereby destroyed, as effectually as if too much quick lime had been used. A field was pointed out to me by an intelligent farmer, where marl had been applied twenty-nine years ago. The field is now in grass, and the boundaries over which marl was spread are still as visible as if a plough had been drawn around it; too much was used, and nothing would grow on it for many years, but within the last few years, corn and wheat have grown and yielded bountifully; but there is yet too much lime for grass, which is thin and sickly: nevertheless, this trial, although a failure, speaks volumes to the farmer; it proves how small a quantity answers without renewing.

Some of our marls are very strong, and it is believed would burn into good quick lime; some are full of shells, and some are nearly destitute of them.

Another of our mineral manures is lime; it is only beginning to attract notice for this purpose. When the cost of wood for burning lime

is lessened by the use of coal and peat, there can be no doubt it will be extensively used as a manure.

The amount of lime burned in the county this season is as follows:

Goshen,	10,650 bushels
Hamptonburgh,	1,400
Minisink,	1,400
Warwick,	4,200
Newburgh,	165,000
Total,	<u>182,650</u>

This at an average price of 25 cents per bushel, yields the sum of \$45,662.50, as the product of this branch of our industry, per annum.

WATER.

Orange is abundantly supplied with springs and streams; on one side is the Hudson, on the other, the Delaware. The Neversink river and Basher's kill enter this county from Sullivan, and empty into the Delaware. On these there is considerable fall. Part of the summit level of the Delaware and Hudson canal is in the county; the last mentioned streams are used as feeders.

Three or four miles from the New-Jersey line, at the eastern base of the Shawangunk mountain, rises the Shawangunk kill. It pursues a northeasterly course at the foot of this mountain, to near Bloomingburgh; thence it separates Sullivan and Ulster counties from Orange, and finally falls into the Walkill, in Ulster.

The Walkill enters the county from New-Jersey, and pursues a very serpentine course without any fall, through the drowned lands, to the outlet. From this point to Ulster county, northeast of Walden, there are occasional falls and sites for water power.

The great marsh, or as it is called, the drowned land, covers an extent of 17,000 acres in this county, and 3,500 in New-Jersey. At high water, this surface is covered, and again laid bare by drainage and evaporation. Many parts of the shore have been annually visited by fevers; since the partial draining has been effected, these have measurably disappeared. This tract appears once to have been a lake, and has been gradually filled to its present level by vegetable matter. It is now a vast body of peat of different qualities. Much of it is very good, covered only with undecomposed vegetable matter. In some places, the

peat is underlaid by shell marl. Several islands are scattered within this tract; they are all limestone land of the best quality, and afford many facilities for burning lime, particularly on account of the abundance of wood in the marshes which surround them. The drainage of this marsh has long been an object of great interest, not only to the proprietors, but to others in the vicinity. Many years since, a large sum was expended for this purpose, in cutting down the bed of the river at the outlet, four miles west of Goshen. This trial partially reclaimed many acres at the shores. The proprietors are now employed in making a new channel for the stream, or at least for the surplus water, near two miles in length; the water now flows in this new channel, and is gradually wearing it broader and deeper. By this channel, it is proposed and expected to render available nearly 30 feet fall. This amount is deemed sufficient to lay the whole tract dry.

If this effort to drain succeeds, and there appears no good reason to doubt it, 20,000 acres of the richest land will be reclaimed, and the surrounding country made healthy.

The Otter kill rises near Thompson's pond; runs through Goshen and Hamptonburgh northeasterly, and falls into Murderer's creek, near Washingtonville. Graycourt creek rises from Little Long pond in Monroe, runs through Blooming-Grove, receives the Otter kill, takes the name of Murderer's creek, and falls into the Hudson, near Cornwall landing.

The Ramapo river has its origin from the Two ponds in Monroe. The Long pond gives rise to part of this river. Its waters run easterly until they enter the Highlands, near Greenwood furnace. The other branch of the Ramapo issues from Mount Basha's pond, winds around and between the mountains, passing Southfield furnace, unites with the other branch at Monroe works; the stream thence pursues a southerly course into Rockland county.

Numerous small streams intersect the county in all directions. A stream called Fallbrook discharges its waters into the Neversink in the town of Deerpark. About a quarter of a mile before it meets the Neversink, it falls over the face of the mountain, forming a beautiful cascade; the whole fall, within the first mile, is said to have been ascertained by Col. Clinton, and found to be 600 feet. About 200 feet of this fall is almost perpendicular.

Our natural ponds or lakes are numerous, and some of them of considerable dimensions. Thompson's pond, in Warwick, covers nearly

100 acres. It gives rise to Quaker creek, a branch of the Walkill. Wickham's pond, lies in Sugar Loaf valley, and discharges its water into Warwick creek. It is surrounded by marsh which is filled with peat, and in some places underlaid with shell marl.

Long pond, or Big Long pond is partly in Orange, and partly in New-Jersey. It is ten miles long and from one to two broad. It is used as a reservoir for the Morris canal.

Round pond and Long pond in Monroe have been mentioned already. Mount Basha's, or as it is called Mombasha, is in Monroe, a mile south-east of the two last mentioned. It is two and a half miles long, and a half to one broad. Sterling pond or lake is a beautiful sheet of water in the corner of Monroe and Warwick, about two miles in circumference, and entirely surrounded by mountains. Its water is finely transparent, and said to be the deepest of any in the Highland mountains. It is the last to freeze in winter. Its waters pass into New-Jersey by way of Ringwood.

Duck Cedar pond in Monroe is narrow, but about two miles long, discharging its waters into the Ramapo, at the saw works. The waters of this pond are so near the level of Ringwood and Sterling valleys, that during the war of the revolution, when operations on the Ramapo were too near the British lines, a dam was erected across the north end and its waters thrown to the southwest to supply the furnace and forges at Ringwood.

In the southeast part of Monroe, are the Cedar pond, Long pond, Green pond, Carr pond, Island pond, Slaughter pond and Two ponds.

In Cornwall, are Round pond, Long pond, Reservoir or Bog Meadow pond, Cranberry pond, Bull's pond, Popelo's pond, and others; these however, are the largest; all are used more or less as reservoirs to supply deficiencies of water in seasons of drought. In Newburgh, about six miles north of the village, is Big pond; a mile wide and nearly three long.

In New-Windsor, a mile west of Snake hill, is Little pond. The water from this pond sinks into a cavern in the limestone and disappears; three quarters of a mile distant, a stream, believed to be the same, emerges from the ground. At times the stream can be heard beneath the ground, 30 or 40 rods, before it bursts out at the surface.

Several of these lakes, in the purity of their waters, and in the beauty and magnificence of their mountain scenery, vie with the celebrated waters of the north of England.

Our springs are numerous; a few are believed to be medicinal waters; some of them will be presented to the analyst of the survey.

The spring and well waters of the county are considered good; but in all parts underlaid by graywacke and slate rocks; much of the water is *hard* from containing a salt of lime in solution. This is probably derived from the rocks, or the stratum of blue marly clay so extensively spread on them.

PEAT.

In the drowned lands, several thousand acres are covered with this substance; it is from three feet to several yards in depth, and on trial proves a good fuel.

The Greycourt meadows, lying in Goshen and Blooming-Grove, contain 500 acres of peat, several feet in depth. It exists in great abundance in Warwick, Minisink, Goshen, Monroe, Cornwall, Blooming-Grove, New-Windsor, Newburgh, Montgomery, Hamptonburgh, Crawford, Walkill and Mount Hope; all the towns in the county except Deerpark. In this latter town the quantity is small. The quantity in the county is unusually large in proportion to its extent, perhaps as much or more so than any other county in the State. It would require a great amount of time to ascertain the number of acres. It is perfectly inexhaustible. If its consumption for fuel ever becomes as general as it is in some parts of Europe, the Greycourt meadows and drowned lands would prove a source of immediate revenue to their proprietors.

ERRATIC BLOCKS—BOULDERS.

These are found in the county in the greatest profusion. Most of the surface is thickly dotted by them, and in many places they are so numerous as to prevent cultivation. Under this term, however, it is not intended to comprehend any rocks or stones, except such as have been removed to considerable distances from the place of their formation. Over the whole surface, from the Highlands on the southeast, to the Shawangunk mountain on the northwest, perhaps nine-tenths of the loose stones are graywacke. Many of them are unlike any rock of this description in the county, while others resemble and no doubt were broken up from the layers upon and near which they now lie. The parent

rock of the former is to be sought for beyond the bounds of the county, but where, has not fallen under my observation.

The next most common and widely spread boulder, is what is called Esopus millstone, and white flint rock, or the millstone grit of Prof. Eaton. These are found abundantly over all that part of the county between the mountains. They are, almost without exception, completely rounded—none are flat or angular. They are evidently more numerous, and much larger in the northern than in the southern towns.

In Montgomery and Crawford, they are often too large to be removed by the efforts and industry of man, even when aided by gunpowder; some may there be seen of five hundred tons weight, and probably much more. As we proceed south, they gradually diminish in size and frequency. How far they extend, I am unable to say, but I have seen them near the New-Jersey line. These boulders are pretty uniform in appearance; their colour is white, bluish, or reddish-white. It is seldom compact, but generally composed of grains and pebbles from the size of small peas to that of white walnuts, and sometimes much larger; some of the pebbles are smooth and rounded, others are angular—nearly all are united by a silicious cement. In a few, iron pyrites exist as the cementing substance, or disseminated through the mass; this decomposes when exposed by a fresh fracture, and gives the rock a greenish appearance.

From what has been stated, I think these masses have been brought into the county from the north by the agency of water. A rock stratum is seen in Blooming-Grove, precisely similar to the boulders just described, but this is shut in by two elevated primitive ridges, and its fragments have had a limited distribution, and can be readily traced to its limit within the county. Boulders of the same millstone grit, and of the same appearance and character, are also found in the valleys of the Neversink and Delaware, but these can also be traced to a stratum in that vicinity, whose fragments have taken a direction not to be mistaken. Another stone which has attracted some attention in the county, is the *labradorite*. Its existence was first noticed by Dr. Heron, of Warwick, several years since. In addition to Warwick, I have seen it the present season in Goshen, Minisink, Walkill, Hamptonburgh and Blooming-Grove. No doubt if sought for, it might be found in many other places; it is found in pieces weighing from a few pounds up to three or four tons. They are all rounded, and very much worn, having the appearance of travellers from afar. No rock formation of this kind is now known to exist nearer than Essex county. Some pieces of these boulders have

been polished, and prove very fine. They usually reflect only the green and blue colours. The best I have seen is in Warwick; also in Walkill, upon the farm of Dr. Shaw; and in Blooming-Grove, upon the farm of Joseph Moffat.

Many other erratic stones are found, not deserving particular notice, but it should be remarked, that wherever transported fragments of a rock are seen in the county, they are always to the southward of the parent rock. Thus, from the south end of Mount Eve, a chain of blocks can be traced for miles, even into New-Jersey, of a character so peculiar as to render mistake impossible. Another stone found in rolled masses, in the county, is jasper. They are yellow, striped, red and black. Many of them contain cavities, lined with small but beautiful quartz crystals, and coatings of white, blue and yellow chalcedony. Some of the jasper boulders are coarse, some fine and compact, some slaty, and some ferruginous. They have but a limited distribution, being found only at the foot and on the northwestern declivity of Bellevale mountain, in Warwick.

IRON ORE.

This valuable mineral substance is found in Orange in great abundance. With a few exceptions to be noticed hereafter, it is associated with our primitive rocks. The most abundant as well as most valuable ore, is the magnetic oxide. It is generally found in that species of primitive rock so common in the highlands of the county, and often called granitic gneiss or gneissoid granite. It lies in beds and layers in this rock, having its line of bearing and its dip. Where it exists in layers, they are from one inch to twenty feet in thickness, in some places alternating several times with the layers of rock. Where it is found in beds, the magnitude of the largest has never been ascertained. In the line of bearing, the extent of our deposits of this ore is not yet well ascertained.

On the southeast side of Butter hill it is traced from the river, and from nearly opposite the village of Canterbury, by way of Monroe, quite into New-Jersey, a distance of about twenty-five miles.

The most westerly of the great ore deposits now wrought, is called the *Clove mine*. It is the property of George Wilks, Esq. situated about a mile south of the village of Monroe. It has been open many years, and much ore has been used. The ore is the magnetic oxide. It is compact and granular. The latter is called shot ore. The pyrites is more or less disseminated through it. It makes *red* or *hot* short iron.

It requires roasting before it can be used. At the south end of the mine exists what is here called soft ore; this is the ore in a black powder. It is taken up with the shovel, ready for use, requiring no roasting process. It would seem to have resulted from the decomposition of the pyrites, and is abundant. The solid ores of this mine are in layers, having the direction and dip, and alternating with the rock. The layers are from a few inches to a yard and more in thickness. Several successive layers, and the intervening ones of rock, have been penetrated in three places; a few rods distant from each other. A large quantity of the soft ore has been used. Altogether, the mine has been opened about 500 feet in length, and evidently extends over a much larger surface, in all directions.

The immediate associates of this ore are mica, hornblende, quartz, feldspar, asbestos, occasionally carbonate of lime, serpentine, chrome crystallized in octohedrons; the latter however, is rare. A kind of soapstone is also connected with this ore.

About one mile southeast of the Clove mine, in a straight line, is the *O'Neil mine*, or as it is commonly called in the vicinity, the *Nail mine*. This is a vast bed of magnetic oxide of iron. It is often in the seams, beautifully crystallized in octohedrons and cubes; the latter are rare; it also contains pyrites, and requires the roasting process. Magnetic pyrites are also occasionally found in this mine; the ore is very hard and compact; the most so of any of our standard ores. This ore is very much esteemed. It makes a good iron, which is of the *red short* description. This mine is the property of Gouverneur Kemble, Esq. Large quantities of this ore are used. The bed is now open 150 by 500 feet. A wall is partially exposed on the southeast side, but no appearance of limit is any where else visible. One dyke has been crossed, which is several feet thick, cutting the bed perpendicularly, and nearly east and west. The immediate associates of the ore in this mine, are calcareous spar white and abundant, rose coloured garnet, green coccolite, dark coloured sahlite and hornblende massive; arragonite, the flosferri variety, amianthus, and serpentine.

Forshee Mines. These are a quarter of a mile southwest of the *O'Neil mine*. It is composed of a great number of layers of ore, alternating with the layers of rock. The whole hill, which is more than one-fourth of a mile long, and nearly as wide, appears to consist of rock and ore, the ore forming a large proportion of the whole. Some layers are granular, forming handsome shot ore; some are compact, and rather

more free from pyrites than usual. In these mines are large bodies of the ore in black powder, which is entirely destitute of pyrites. Umber also is connected with the Forshee mines, and appears to be abundant and of fair quality.

The minerals, associated with the ore of the Forshee mines are red garnet, brown tremolite, green coccolite, serpentine yellow and black, calcareous spar, asbestos and mica.

Five miles southeast of Monroe works is the *rich iron mine*, the property of Hudson McFarlan, Esq. It is a fine rich ore, strongly magnetic. It has not been extensively wrought, although there are evidences of an abundant deposit. Connected with this mine, are mica, hornblende, or as this mineral is generally called in Cornwall and Monroe, black-jack-sahlite, magnetic pyrites.

The *Greenwood mine* is two miles southeast of the Greenwood furnace in Monroe. It is in the granitic gneiss. Three layers of ore, separated by a few feet of rock, are exposed there. The middle one of these is only sufficiently uncovered to reveal its thickness. This one is nine feet. This mine is covered by what some miners call a rider, that is, rock lying nearly or quite flat, or hanging in a direction contrary to the dip of the ore and rock in which it lies. This rock roof covers this mine; after its removal, the ore and its walls lie conformably, that is, dipping to the southeast. The ore is mostly compact and hard, containing considerable sulphur, and requires roasting. It is associated with quartz, hornblende and mica. Preparations are making to use it extensively.

Long mine is about five miles southwest of Southfield furnace, and two and a half miles west of the saw works. This mine has been known since long before the revolution, and is the only one in the county at which any thing like systematic mining has been attempted. This ore has its bearing and dip corresponding with those of the rock. Only one layer of the ore has been worked, which is six feet thick. The ore is strongly magnetic, and said to be as good as any in the Highlands. It is associated with hornblende, sahlite, slaty gneiss, gneissoid hornblende and reddish granite—has a small quantity of pyrites—requires roasting, and gives a red short iron.

This mine has been worked 300 yards in length and about 40 in depth. The early working has all caved in; but fine pillars of ore sustain the hanging wall where the work has been recently prosecuted.

Vast quantities of ore have been taken from this mine without any appearance of its failing. It belongs to the Messrs. Townsend. Only one dyke has ever occurred in this mine; it was one foot thick, and made no change in the direction of the ore. It cannot now be seen—is worked 70 feet deep.

The *Patterson mine* is half a mile southwest of Long mine—ore very similar in all respects—makes excellent *red short iron*—is in the granitic rock. The ore is twenty feet thick—opened 150 feet long. About 10,000 tons of this ore have been used. It is strongly magnetic, and has polarity.

About the middle of the mine, as now open, is a transverse slip or *heave*; the mine and its walls appearing as if they had slid downwards and forwards to the southeast, causing an angle in their line of bearing. It is the property of the Messrs. Townsend.

Mountain mine, Antone mine, Conklin mine and *New mine*, are a group from twenty-five to fifty rods northwest and north from the Patterson mine, belonging to the same proprietors. They lie in nearly parallel beds; the ore of all apparently similar—a rich black magnetic oxide, possessing polarity. Ore to the amount of 5,000 tons has been used from these mines; the ore and walls nearly vertical; layers of ore from four to eight feet thick. The new mine has a cap of rock lying nearly horizontal; associated minerals, sahlite, hornblende, and feldspar. The sahlite is laminated and very beautiful; iron red short.

Crossway mine, upon the same estate, is 400 or 500 yards southwest of Mountain mine. This bed is 14 feet thick, and has been wrought 65 feet deep and 150 yards in length; ore and iron very similar to those of Patterson mine; moderately *red short*; ore and walls nearly vertical; 28,000 tons are supposed to have been used from this mine; associated minerals, hornblende, epidote, mica and adularia.

Sterling mines, belonging to the same gentlemen, are about a mile southwest from Crossway mine, at the south end of Sterling pond. These mines, or *this vast mine*, is in the northern end of a mountain of moderate elevation; its length is about three miles. The ore is *rich*, granular and compact; its product, *cold short iron*; is one of the earliest known iron mines in the United States. The minerals connected with this ore are crystallized green hornblende, sahlite, green mica, flesh-coloured feldspar, and the ore in octohedral crystals. The rocks are granite, and a coarse showy sienite. There is abundant evidence of great

disturbance in the stratification in this mountain, and in all the vicinity. The rocks dip to the northeast and east, with the ore conformable to this arrangement; at least such is the general arrangements, so far as can be ascertained in this mass of confusion. The ore alternates with the rock; how often, cannot of course be ascertained. The ore lies naked about fifty rods wide by 150 yards in length. In many places its surface is even and polished as if it had been ground off by the sliding of the rocks.

The *Belcher mine* is upon the same property, and very similar ore to that of Sterling; it makes *cold short* iron. It is one and a half miles southwest of Sterling mines, and at the southern termination of the same mountain. The ore has been worked about 115 feet wide without finding a rock wall on either side. It is believed to be a prolongation of Sterling mine.

Red mine or *Spruce Swamp mine* is nearly three miles south of Long mine. All the ores of this mine are magnetic and full of pyrites, so much so that only a moderate amount has been used. They decompose rapidly when dug up and exposed to the open air. In this manner the surface of this mine has all been reduced to powder of an iron-rust colour; like several other mines the ore alternates with the rock.

Magnetic oxide of iron is also found of good quality in many places in Cornwall; but these have not been opened to much extent. Near the foot of Butter hill, on the land of Mr. Clarke, on Deer hill, on the land of Mr. Luke Wood, and that of Thomas Titus, are indications of valuable deposits of this ore.

Two and a half miles west of the village of Canterbury, in Cornwall, is the *hematite* or *limonite* mine of Mr. Thomas Townsend. For the last two years this ore has been considerably used, and although a lean ore it makes excellent iron. It is mostly in powder, or very small fragments, mixed with balls and pieces of the hematite, of a few pounds weight. It lies in limestone rock, and between the limestone and the grit rock. These rocks, where connected with the ore, are decomposed to great extent, and mixed in the state of powder with the ore; hence the ore requires washing.

This stratum of limestone and hematite can be traced across this town into Monroe, until we reach the magnetic oxides already noticed. It is seen a quarter of a mile north of the Clove mine, and at many places intermediate between this and the Townsend mine in Cornwall. The distance between these extreme points is full ten miles.

Hematite is also found along the whole western side of Bellvale mountain, and in places along the Warwick valley, to the New-Jersey line.

Thus it appears, that in Orange, one great iron region extends from the Hudson river on the east side of Butter hill quite across to Rockland county.

Another on the west side of Butter hill follows the valley across Cornwall, east of Skunemunk mountain, through Monroe, and by way of Sterling into New-Jersey, and far across that State.

The amount of ore in these deposits, which is of easy access, and has the most perfect facilities for cheap mining, is perfectly inexhaustible.

The amount of iron to be made in the county in all time to come, can only be limited by the supply of coal necessary for the reduction of the ores.

List of minerals observed in making the examination of the county of Orange, by W. Horton,

Magnetic iron ore, crystallized, O'Neal mine, Monroe.

do	do	do	Sterling	do
do	do	massive,		
do	do	do	O'Neil	do
do	do	do	Forshee	do
do	do	do	Sterling	do
do	do	do	Belcher	do
do	do	do	Crossway	do
do	do	do	Spruce swamp	do
do	do	do	Mountain	do
do	do	do	Patterson	do
do	do	do	Long	do
do	do	do	Greenwood	do
do	do	do	Rich iron	do
do	do	do	Horsen clever	do
do	do	do	Forest of dean	do
do	do	do	Clove	do
do	do	do	Green's mine, Deer hill,	Cornwall.
do	do	do	Titus'	do do
do	do	do	2 miles east of	Warwick,
do	do	do		Amity,
do	do	do	4 miles SE Woodbury furnace,	Monroe

Magnetic pyrites, O'Neil mine, Monroe.

do do Rich iron do

Iron do in cubes, 2 miles southeast of Warwick.

do do cubic, Carpenter's point.

do do do 4 miles north of Newburgh.

do do massive Clove mine, Monroe.

do do do O'Neil do

do do do Greenwood do

do do do Rich iron do

do do do Forshee do

do do do Spruce swamp do

do do 2 miles south east of Warwick.

do do Sugar loaf and Snakehill, Goshen.

White do in crystals, Rocky hill, Warwick.

Skorodite drusy, Edenville.

Arsenical iron, massive, Edenville and Amity.

Brown and red hematite or limonite, in a bed 2½ m. W. of Canterbury.

do do do ¼ m. N. of Clove mine, Monroe.

do do do Bellvale, 4 m. E. of Warwick.

do do do near New-Milford, 3 m. SW do

Bog ore, Blooming-Grove.

do Goshen,

do New-Windsor.

Arsenical iron, Edenville,

do Amity.

Arragonite, Edenville.

do 1½ miles west of Newburgh.

do O'Neil mine, Monroe.

Satin spar, Blooming-Grove.

do 5 miles south of Goshen.

Brown spar, village of Warwick.

do 1 mile southeast of Warwick.

do Hampton 6 miles northeast of Newburgh.

Calc or rhomb spar, white, Amity.

do do red, do

do do white, O'Neil mine.

do do red and white, 2 m. E. Greenwood furnace Monroe.

do do 4 miles SE of Woodbury furnace.

do do do Two ponds, Monroe.

Iceland, 1 mile SW of Amity.

Quartz, crystals, Blooming-Grove.

do do Warwick.

do do Goshen.

Sulphate of lime, 1 mile NE of Edenville.

Phosphate of lime, crystalized, Amity and Edenville.

Hornblende, do Sterling, Monroe.

do do Two ponds, do

do do Amity.

do do Mount Eve.

do do 1 mile north of Edenville.

do do 1 mile NW do

do do 1 mile SE of Amity.

do do 1 mile south of do

do do 1 mile SW of do

Augite, crystals, Two ponds, Monroe,

do do Greenwood furnace, Monroe.

do do 2 miles SE of Greenwood furnace.

do do Fort Montgomery.

do do Edenville.

do do Amity.

Coccolite, 4 miles west of West-Point.

do Forest of Dean, Monroe.

do beautiful black, Forest of Dean, Monroe.

do Greenwood furnace, Monroe.

do 2 miles east of Greenwood furnace.

do 2 miles SE of do

do 1 mile west of Monroe works.

do Forshee mines.

do Amity.

do O'Neil mine, Monroe.

do Rocky hill, Warwick.

Sahlite, Forest of Dean, Monroe.

do " " mine, Monroe.

do Rich iron mine, do

do 3 miles SE Greenwood furnace, Monroe.

do Long mine, Monroe.

do Mountain mine, Monroe.

do Patterson do

do Sterling do

do O'Neil do

Scapolite, crystallized and massive, Two ponds, Monroe.

Scapolite, crystallized and massive, Greenwood furnace, Monroe.

do do 1½ miles north of Edenville.

do do Amity.

Meionite, Two ponds, Monroe.

do Forest of Dean, do

Boltonite, 2½ miles SE of Monroe works.

do Two ponds, Monroe.

do Forest of Dean, do

do 4 miles west of West Point, Cornwall.

do fine, 4 miles SE of Woodbury furnace, do

Mica, greenish white, Forshee mines.

do green, Clove mine.

do do Sterling mine.

do black, Greenwood Furnace.

do red, Mount Eve.

Zircon, brown, do

do red, Deer hill, Cornwall.

do do Amity.

do red and white, McGee's hill.

do black, Rocky hill, Warwick.

do do 1 mile NE Amity.

do red, 1 mile north of Edenville.

do black enclosed with white, Rocky hill.

Tremolite, green, 1 mile north of Edenville.

do brown, do do

do white, do do

do gray, do SW of Amity.

do white, do do

do " do do

do brown, do SE do

Pargasite, Amity,

do 2 miles NE Greenwood.

do Two ponds, Monroe.

do Forest of Dean mine, Monroe.

do 4 miles west of West-Point, Cornwall.

do do SE Woodbury Furnace, do

Idocrase, Amity.

do 1 mile SE of Amity.

do do south do

do do north of Edenville.

Sapphire, do east of Amity.

Sapphire, 1 mile south of Amity.

Oxide of Titanium, 1 mile SW of Amity.

do 1½ miles SE of Warwick.

Sphene, Amity.

do 1 mile SW of Amity.

do do NE of Edenville.

do Rocky hill, Warwick.

do 4 miles SE of do

do do Saw works, Monroe.

do Two ponds, Monroe.

Crichtonite, 1 mile south of Amity.

Spinells, 2 miles east of Greenwood, Monroe.

do black, Amity.

do do 1 mile south of Amity.

do do ½ do west do

do do 1 do north of Edenville.

do do Mount Eve.

do red, ½ mile SE of Amity.

do do do

do do 1 mile SW do

do gray, 1 do do

do green, do

do black, 2½ miles SE Monroe works.

do do Two ponds, Monroe.

do do 4 miles west of West-Point, Cornwall.

do do Forest of Dean, Monroe.

do do 4 miles SE Woodbury furnace, Monroe.

Clintonite,* Amity.

do 1 mile SW of Amity.

Warwickite, 1 mile south do

Serpentine, Queensborough, Monroe.

do Forshee mines, do

do 2 miles NW Sterling, Warwick.

do 1 mile south of Amity.

do do SW do

do do east do

do O'Neil and Clove mines, Monroe.

* This mineral was first found by Dr. Horton, Mr. John Finch and myself, in the summer of 1828. We conceived it to be a new mineral, and gave it the name of Clintonite. It was afterwards described by Mr. Finch, under the name of bronzite, which he then believed it to be. It was afterwards called seybertite, and afterwards holmsite. As one of the original discoverers of the mineral, I claim the name originally given, in honor of our distinguished statesman, scholar, and man of science, De Witt Clinton.

Brucite, 1 mile north of Edenville.

do Amity.

do 1 mile south of Amity.

do do north of Edenville.

do every where, Amity and Edenville.

Tourmaline, 1 mile north of Edenville.

do do SW of Amity.

do Rocky hill, Warwick.

do yellow, 1 mile SW of Amity.

Orpiment, 1 mile north of Edenville.

Fluor, 1 mile east of Amity.

do do SW do

do do north of Edenville.

Plumbago, Amity.

do radiated, 3 miles SW of Saw works, Monroe.

Labradorite, 1 mile SW of Philipsburgh.

do Walkill.

do $\frac{1}{2}$ mile NW Washingtonville, Blooming-Grove.

do Warwick.

do 4 miles south of Goshen.

Feldspar, red, Sterling mine.

do do Patterson do

do Two ponds, Monroe.

do Buttermilk falls, Cornwall.

do white, 4 miles west of West-Point.

do do Mountain mine.

do do Rocky hill, Warwick.

do red, Mc'Gee's hill.

do white, (adularia) 3 miles SE of Monroe works.

do crystallized, Amity.

do do Rocky Hill, Warwick.

do do 1 mile north of Edenville.

do do do east of Amity.

Kaolin, 1 mile north of Southfield furnace, Monroe.

Epidote, crystallized, 1 mile north of Southfield furnace, Monroe.

do do Long mine, Monroe.

do 4 miles SE of Warwick.

Lydian stone, Canterbury, Cornwall.

Jasper, red, yellow and black, Bellvale, 4 miles east of Warwick.

Chalcedony, white, yellow and blue, do do

Cacholong, do do

Galena, Fallbrook, Deerpark.

Pseudolite, 1 mile SW of Amity.

do do south do

Kyanite, Rocky hill, Warwick.

do 2 miles SE of Warwick.

do Queensborough, do

Fibrolite, do do

Talc, 1 mile SW of Amity.

do 1 do SE do

Cinnamon stone, 1 mile SW of Amity.

Garnet, 1 mile SW of Amity.

do O'Neil mine, Monroe.

do Two ponds. do

do 2 miles east of Warwick.

Asbestos, Mount Eve.

do Forshee mines.

do Clove mines.

Amianthus, Amity.

do O'Neil mine.

do Greenwood furnace, Monroe.

do Clove mine. do

Diallage, 1 mile south of Amity.

Chrome, crystallized in octohedrons Clove mine, Monroe.

The statements here subjoined are from Peter Townsend, Esq. one of the oldest iron masters of our country; he was born in the vicinity of an iron furnace, and has been engaged in this business during a long life, has introduced many improvements, and by his enterprize and industry has done much to benefit his country in time of need. He cast the first cannon in this country; he also put steel works in operation, and has long been a highly useful citizen.

Sterling mine—discovered in 1750, by whom unknown; named after Lord Sterling, the then proprietor of the soil; he sold, and a blast furnace was immediately put in operation by Messrs. Ward and Colton, that is, in 1751; cost of mining is $37\frac{1}{2}$ cents per ton. Its yield is always 50 per cent in the blast furnace. Amount of this ore used has ranged from 500 to 2,000 tons annually; the medium of this gives 137,000 tons as the amount of ore used from this mine. At present the amount used is 2,000 tons; the ore always fuses easily; its iron is between *cold* and *hot* short; very sound and strong. It has been largely used for casting cannon and for making bar iron; no proper dykes in

the mine, it lays on the side of a mountain. The ore, in different places where opened, is from 10 to 20 feet thick, inclining at an average angle of 30° . The floor is smooth granitic rock, a little over three feet thick; rests on another bed of soft rich ore, and the little used proves free of sulphur. (I may add from my own knowledge *positively*, that another immense bed underlays the last mentioned.—*Wm. Horton*.) Sterling mine covers a surface of more than 30 acres, by survey; part of this the ore is bare, part is covered by soil from one to five feet in depth, and part by rock, from six inches to a yard, or more, in thickness.

Long mine—discovered in 1761, by David Jones, has never been bottomed in any place. It is traced over a mile in length; is wrought 40 rods in length, general width 16 feet, consisting of two parallel layers, with a waving *slab* of rock between them from 4 to 12 inches thick. In this 40 rods a dyke has been found, of what Mr. Townsend calls an imperfect flint, 2 feet thick, standing perpendicularly, and crossing the ore at right angles, (it is now covered.) All the ore similar; yield always 62 per cent. Average amount of ore used 500 tons; this in 75 years gives 37,500 tons taken from this mine. Its iron is remarkably tough clean, and strong; cost of mining from 50 cents to \$1 per ton. The iron of Long mine has been much used for cannon steel, muskets, wire and fine malleable iron. It has also been cast into harness buckles, and after annealing, proves exceedingly tough and strong.

Patterson mine—discovered in 1831 by John Patterson. 1,000 tons of this ore are used annually, which in 7 years gives 7,000 tons as the amount. Cost of mining from 50 cents to \$1 per ton; yields 56 per cent. Its ore chiefly used to correct infusible and bad ores, such as O'Neil and lean hematite ores. Iron good.

Red mine, or Spruce swamp mine—discovered in 1780, by J. Stupersell; cost of mining 50 cents per ton; ore sulphurous; being remote, not much used; iron sound; has been generally used as a flux, mixed with hard black oxides and refractory *cold short* ores; it assists fusion, and improves the quality of the iron.

Mountain mine—Discovered in 1758, by a hunter, in consequence of a tree being blown up by the roots; yield 45 per cent; iron remarkable for strength and *fine polish*; cost of mining \$1 per ton. Two dykes cross this mine at an angle of 45° , each 15 inches thick. Before the revolution, when this mine was chiefly worked, the iron was sent to England to be used for tinning.

Crossway mine—Found in 1793, by John Ball; yields 50 per cent; iron good for casting, and malleable; none used last 30 years, mine being wet; cost of mining \$1 per ton.

Antone mine—Discovered by John Antone; ore yields about 50 per cent. In all respects similar to Crossway mine, and is, in fact, the same continued; cost of mining \$1 per ton.

Belcher mine—Found in 1792, by Jacob Belcher; ore yields 48 per cent; iron cold shot; cost of mining $37\frac{1}{2}$ cents per ton; ore well adapted for making bar iron by the the blooming process, for which only it has been used.

The first furnace on this tract, at Sterling, in 1751, by Ward & Colton, used Sterling ore, until the discovery of Long mine. The first forge at Sterling in 1752, built by Abel Noble, from Bucks county, Pennsylvania. There have been two forges of eight forge fires.

Southfield furnace, now in operation, was built in 1806; its annual average of iron is 750 tons, and 225 bushels of coal to the ton of iron.

Sterling averaged annually 800 tons of iron, and it was made into 550 to 600 of bar iron.

Before, and during the revolution, the annual production of iron (pig) in this county, was 1,500 tons, and about 1,000 tons bar iron. From 1830 to 1838, there has been made annually in this county 3,000 tons of pig, but the bar has been diminished. Steel was first made on this tract in 1776, in the German manner, by the late Peter Townsend, Esq. Pig iron was first used for this purpose, and subsequently bar iron.—The first blister steel manufactured in the State of New-York was in 1810; it was made by the present Peter Townsend, Esq. from the iron of *Long mine*. It was used for edge tools, and proved equal to the Dunamore Swede iron, called hoop. The first anchor made in the State of New-York, was at Sterling forge, in 1773, from iron of Long and Sterling mines.

The great chain extended across the Hudson at West-Point during the revolution, was made at Sterling in March and April, 1788, by the late Peter Townsend, Esq. It was contracted for, and its making superintended by Timothy Pickering, Esq. The iron of this chain was made from equal parts of Sterling and Long mine ores; the weight of each link was from 140 to 150 lbs. and the whole chain 186 tons, made and delivered in 6 weeks.

The first cannon made in the State were by the present Peter Townsend, Esq. in 1816, from the iron of Long mine; they were 6, 12, 18, 24 and 32 pounders. *Not one failed* in the proof; some of them were light field pieces, all for the Government of the United States. The 6 and 12 pounders were made to order lighter than British brass field pieces of the *same size*, still the metal withstood proof.

Signed,

W. HORTON.

(C.)

REPORT

Of L. D. Gale, to W. W. Mather, on the Geology
of New-York county.

GEOLOGICAL SURVEY OF THE ISLAND OF NEW-YORK.

This island is about twelve miles long, and from a half of a mile to two miles and a quarter broad.

To give a clear view of the geology of the island, it will be necessary to state in general terms the character of the neighboring rocks, boulders of which there is good evidence to believe are found on almost every part of the island.

Taking the Hudson river as the dividing line, we have on the east, the island of New-York, and the southern portions of Westchester county, consisting of gneiss and its subordinate rocks, as *serpentine*, *hornblende*, *primary limestone*, *anthophyllite rock*, and perhaps a few others; while on the west in the contiguous State of New-Jersey, we have *red sandstone* in all its varieties; *serpentine*, *greenstone* in all its varieties, with the minerals usually accompanying these rocks.

The basis rock of the island is *gneiss*, if we except about one mile in length of the northern extremity, which is limestone. The middle and northern portions are rough and broken from the almost constant exposure of the rock above the surface; while the southern, although consisting of the same material, is every where covered, and in some places to great depths, with alluvial* and diluvial deposits.

The gneiss varies considerably in character in different portions of the island. For example, the northern part abounds largely in lime-

* Whether some of these alluvial deposits referred to, especially the beds of sand found under the diluvium, are as old as the tertiary or not, I will not pretend now to determine.

stone; and the western in veins of granite and quartz; while the southern and eastern, as well as the middle portions, are more purely gneiss.

The covering of the rock, in the southern part of the island, is in some places more than 100 feet in depth, and consists generally of from 10 to 80 feet of diluvium (loam, gravel, or boulders, one or all) on the surface, resting on the same or greater thickness of alluvial or tertiary sands, which last are highly stratified, and in many places even exhibit the appearance of ripples as from the retiring waves of the ocean. As we proceed northward, the deposits grow thinner and thinner, until the rock makes its appearance above the surface. This occurs on the east side of the island, between 13th and 16th-streets, and on the west, from 29th to 31st-street. The greatest thickness of diluvium is at the southeastern extremity, where it was accumulated in conical hills, some of which were 70 or 80 feet above the grading of the streets. The general direction of the strata, corresponds very nearly with that of the avenues; and the dip, though generally to the west, averages within 10 degrees of vertical. In speaking of different sections, the dip, on the west side, more especially from the city to Harlem valley, is with few exceptions, vertical; and the same remark applies to the middle portions, as far east as to the Eighth avenue; while on the east side, from Fourth avenue to the river, the dip is quite irregular; varying from 45° west to 45° east; although the composition is more uniformly gneiss, than in other portions of the island.

In a few cases, it has been found that carbonate of lime enters into the composition of the rock of the island. This is the case on the east side of the Fourth avenue, from the 118th-street to the 120th-street. Here the rock retains its identity, as gneiss, to all appearance; although half of its mineral matter is carbonate of lime. Again, at 157th-street, and about 100 feet west of Tenth avenue, the rock is entirely changed, both in composition and structure. In composition, it is a mixture of limestone and serpentine; while in structure, it is destitute of strata, and lies in beds.

The following remarks will be arranged under seven heads, as follows:

1. Description of the region between the city of New-York and Harlem, and Manhattanville valley.
2. The region between the above valley and Kingsbridge, or from Harlem and Manhattanville valley, to the northern extremity of the island.

3. General remarks on the transported materials of the island, both alluvial and diluvial.
4. Alluvial beds or valleys.
5. Boulders; their abundance and sources in different sections.
6. Minerals enumerated. 1st. Those peculiar to the rock of the island.
2d. Those that have been transported.
7. Diluvial grooves and scratches.

I.

Description of the region between the city of New-York and the Harlem and Manhattanville valley.

The section lying between the settled portion of the city and the level valley extending from Manhattanville on the Hudson, to Harlem on the East river, is generally bounded on the south by the out-cropping of the gneiss, which as before stated, commences on the west at 31st-street on the 10th avenue, and at 29th-street on the 9th avenue, at 28th-street on the 8th avenue, at 24th-street on the 7th avenue, at 20th-street on the 6th avenue, and at 16th-street on the 5th avenue, where it comes within 4 feet of grading; on 13th-street, between University place and Broadway, it again approaches within three feet of the surface; and on 4th, 3d and 2d avenues, at their several junctions with 16th-street, it appears at or above the surface; while on the 1st avenue, it crops out first at 21st-street, and continues as we progress to the northward on the banks of the East river, until we reach 94th-street, which is at the eastern termination of Harlem flats, where the rock dips below the surface, leaving a salt marsh which from this point continues northward. Again commencing on the west side of the island, we find the rock continues from 31st-street northward to Manhattanville, almost constantly above the surface at or near the water's edge.

The elevated points of this section of the island vary from 70 to 120 feet above tide water mark, and will when graded, give at a rough estimate a medium level of about 40 feet above the contiguous waters. The valleys, however, are often deep, and the hills precipitous, rendering this section rough and broken.

The 3d, 4th and 8th avenues have been cut through until they reach the Harlem river; the first two terminate at Harlem, the other at McComb's dam; 5th and 7th avenues terminate at 21st-street; 6th avenue extends to the Bloomingdale road at 32d-street; 10th avenue to the same road at 70th-street, in the village of Bloomingdale; and 9th avenue terminates at 42d-street.

The excavations for the above avenues have rendered Geology an essential service by exposing the rocks of the island, and exhibiting their surfaces, their stratification, their mineral ingredients, and included minerals. The strata of the rock, as before stated, (page 178) follows more generally the direction of the avenues, which run north 35° east. Of about seventy-five observations on this section, to ascertain the strike of the strata, more than fifty gave results varying from north 25° east, to north 35° east, making the medium strike north 30° east. Two extremes were north 45° east, and north 45° west.

The dip of the strata was taken in eighty-four different places on this section. Of these, twenty-nine were vertical, thirty-eight were to the west, and eight to the east. Of the thirty-eight which dip westward, twenty-four are between 80° west and vertical, seven between 70° west and 80° west, and three between 45° west and 70° west. Of the eight which dip eastward, six are from 80° east to vertical, and two are 45° east. Of the eighty-four observations, fifty-eight were within 10° of vertical, and only six gave an eastward dip. The result is, therefore, that the medium dip of all the rocks of this section is westward about 85° .

The quality of the rock which forms the substratum of this section, does not differ much from that of other parts, whether north or south of it; therefore, with some few exceptions, a proper description of the rock as it occurs here, will answer for the whole.

As to its components, it contains a large proportion of mica, a small proportion of quartz, and still less of feldspar; but generally an abundance of iron pyrites, (sulphur and iron) in very minute crystals, which on exposure, are decomposed. The sulphur and the iron both take oxygen from the air, and the result is free sulphuric acid, copperas and iron rust. The first two combine in their agency to hasten the disintegration of the rock, and the third gives it a permanent ferruginous cast. In consequence of these ingredients, it is generally fissile, tender, and soon disintegrated on exposure, rendering it unfit for the purposes of building.

In some cases, the rock is so highly charged with pyrites, that on exposure for a few days in a dry season, it becomes covered with copperas in the state of an efflorescent powder, exhibiting the appearance of white frost in an autumnal morning. This phenomenon I have repeatedly seen on the rocks at the Hell-Gate ferry.

Besides the regular ingredients of gneiss, it occasionally happens that the mica is replaced, either wholly or in part, by hornblende; in which case its colour is rendered darker, it is more compact in texture, and columnar in its structure. This occurs on the 4th avenue, in the railroad cut at the south opening of the tunnel.

As before stated, (page 177) the gneiss on the western side of the island so abounds with veins of granite parallel with the strata, that in many places they constitute the chief material of the rock; and will, I doubt not, at a future day, be wrought for useful purposes. This has indeed been the case to some extent; many sloop loads of stone cut for culverts and other faced work on the Croton aqueduct, have been prepared from the material furnished in opening the 10th avenue, and delivered. It is a fair granite, specimens of which I have furnished and labelled "granite from 10th avenue, near 48th-street." The granite prevails more or less from 31st-street on the west side, and from 24th-street in the middle, to 60th-street on the north, and most of it runs out southwest of Bloomingdale road. I am fully convinced that in cutting through the streets and levelling the lots, a large amount of excellent building material will be furnished, and will be a source of profit at a future day.

The stone furnished for the aqueduct was delivered at the dock near the place of consumption, at \$1 or \$1.12½ per cubic foot, dressed for the work, which, I was informed by one of the contractors, was about the same as it would cost to get them out and put them in shape when equally good materials could be furnished on the spot. This circumstance is explained by the fact that those who furnish it were contractors with the corporation of the city for opening the avenues on the island, where they are paid a certain amount not exceeding \$1 or \$1.10 per cubic yard, for removing the stone out of the way, and are at liberty to make such use of it as they please. The cutting of the stone, therefore, after it is removed from the quarry, is the chief expense to the furnisher; this shows why it can be furnished at so low a rate. The amount paid by the corporation for removing loose earth, varies from 12 to 30 cents per cubic yard, according to the nature of the earth to be removed, and the distance to be carried to get it out of the way; the most common price is 18 cents, and the same price is paid for filling in valleys, whether with stone or earth; and if it is done by the load, as is frequently the case, nine cubic feet make a load for one horse.

Where rough stone are furnished for basements and other rough work, they are delivered at \$1.00 a load, so that contractors sometimes get

pay for excavating, and also for the material excavated, expense for carting excepted.

The northern boundary of the above section will be more particularly described in the remarks on the Harlem and Manhattanville valley.

The anthophyllite rock of this section of the island will be described with the boulders, hereafter.

II.

Description of the section of the island lying between the Harlem and Manhattanville valley, and the northern extremity of the island.

This section commences on the east side of the southern boundary, at the northern limits of Harlem village, a few hundred yards northwest of Harlem bridge, and at about 134th-street, and on the west side of the island at the village of Manhattanville, at about 128th-street, and extends in a northeasterly direction to Kingsbridge, a distance of not far from five miles. This section, though rough and broken, is less so than the northern part of the last described. A considerable part of it is still covered with its native forests, though most of it is capable of tillage. The southern part extending northward as far as the ten mile stone, taken as a whole, is more level than the northern; but from the ten mile stone to the northern extremity, it may be considered as divided into three sections, the western, the middle, and the eastern. The western is a continuous ridge of gneiss from a quarter to half a mile in width, and from 60 to 100 feet above the waters of the Hudson. The middle is a long narrow valley commencing a little north of the ten mile stone, continuing northward to Kingsbridge, and descending most of the way; it is in this valley the great Kingsbridge road passes. This valley is lined abundantly with boulders of sandstone, greenstone, and white limestone, like that from Kingsbridge, with large quantities of sand and loam. On the western side of this valley, the rocks of the western ridge are very precipitous, being in many places 50 or 60 feet perpendicular. The third, or eastern section, lying directly east of the Kingsbridge road, and nearly parallel with it, is a ridge of gneiss of some elevation, though inferior to the first or western ridge; and is covered to a very considerable depth on its western slope with transported materials in which diluvial loam, and boulders of greenstone and white limestone are most numerous, though many other varieties are to be seen. The eastern face of this ridge is precipitous, and borders on Harlem river or the intervening marshes. It is lower and shorter than

the western, dipping down below the surface in the vicinity of 198th-street and the 10th avenue.

From the 198th to 204th-street, on the Kingsbridge road, a narrow valley is formed by an opening through the western ridge, and extending from the Hudson to Harlem river, in a northwest and southeast direction. Through this valley vast masses of diluvial loam and gravel, with sand and pebbles and boulders, have been transported and piled up in conical hills east of the road, and on the northern slope of the eastern ridge, which is covered by abundance of boulders of limestone, granite, greenstone and sandstone.

At the northern part of this valley, and from thence to the northern extremity of the island, the road continues on the east side of the ridge, and in view of the East river, leaving all of the high grounds on the west. At this northern portion of the valley, and on the eastern slope of the ridge, the limestone generally called Kingsbridge marble commences and continues to Kingsbridge, a distance of nearly a mile and a quarter. This marble, which has been chiefly wrought for burning into lime, is mostly of the variety called granular limestone, and is so loose in texture that after exposure for a time to the weather it falls to pieces, becoming a kind of calcareous sand. It belongs to the gneiss formation, as is evident from the commingling of the two in many places throughout the course of the limestone. At the junction of the two rocks, and often for a considerable distance into the marble, it retains the structure of gneiss with the mineral matter of limestone; but where the matter becomes pure limestone, it lies in beds without stratification, or but obscurely stratified.

At the southern limit of the limestone, where it is from 50 to 80 yards in width, and about 100 yards west of the road, the strike is north 30° east, and the dip vertical. It is flanked on both sides by gneiss, and as it continues northerly in the direction of the strike or bearing of the strata, it widens until it becomes from 400 to 600 yards in width, and from 10 to 30 feet in height, forming a low ridge immediately west of the road, but east of the main ridge of gneiss which flanks the eastern shore of the Hudson, and which terminates at Tubby Hook, about half a mile north of the commencement of the limestone. As the gneiss runs out at the mouth of the Spuytenduyvel creek, the whole ridge northward is limestone, the form and extent of which may be learned by inspecting the map of the island, where it is encircled in pencil mark. The strike was examined in a number of places on the

ridge of limestone, and varied from north 25° east, to north 45° east, and the dip from 50° east to vertical. From Mr. Dykeman's house, which is near the southern line of the limestone, to the old tide-mill, (which is nearly opposite to Tubby-Hook,) at distance half a mile or a little more, is a line of abandoned quarries, which many years ago were extensively wrought for burning into lime; but as the lime was of inferior quality, other varieties at length superseded it. This limestone has been called dolomite, but whether from its granular structure, or from its composition, I am unable to determine. I have not met with any analysis of it, nor do I think there is any on record.

The individual minerals, and the diluvial furrows, will be considered in another place.

The extreme eastern part of this section lies east of the three divisions already considered, and is bounded east and north by the Harlem river, west by the valley of the 8th avenue, and on the south by Harlem and Manhattanville valley. It terminates on the north at McComb's dam, about one mile north of the Harlem bridge, and consists of a low ridge of gneiss, following the line of the 7th avenue. It is from 200 to 400 feet wide, and from 50 to 80 feet above the contiguous plains. The valley through which the 8th avenue passes, is throughout its course a perfect level, and but a few feet above the waters of the river. The strike of the strata of this ridge at 142nd-street is north 25° east, and the dip vertical. In the extreme north, at McComb's dam, the gneiss crops out. It has the strike north 35° east, and the dip vertical; and is covered in many places to the depth of 15 or 20 feet with diluvium, consisting of loam, sand, gravel and pebbles, with boulders of white limestone, like that of Kingsbridge, greenstone like that of the Palissades, sandstone and granite. The granite is generally rough and angular; while most of the others, especially greenstone, are rounded and smooth. In this vicinity the general course of the river, as well as the valley through which it runs, is SSE, so that any current from the northwest would be likely to accumulate any materials swept along in its course on such prominences as that at McComb's dam.

III.

General remarks on the transported materials of the island, both alluvial and diluvial.

The island contains in every part abundant evidence of a current having swept over it from northwest to southeast, both from the grooves and scratches still visible on the solid rocks of the island itself and its

vicinity, and from the materials themselves being traceable to the original rocks, whence they have been transported. The southern part of the island contains the largest amount of these materials. In the southeastern extremity of it, usually denominated Corlear's hook, the surface has been graded in some places 70 or even 80 feet below the natural level, and shafts have been sunk 75 or 80 feet more without reaching the rock. The diluvium and alluvium together are therefore in this vicinity at least 150 feet, the streets having been graded in some places half that depth below the original soil. It is proper to state that the whole of Corlear's hook and its vicinity originally consisted of a series of conical hills of diluvial sand, gravel and pebbles, with masses of all sizes, from pebbles to boulders 15 or 20 feet in diameter; all of which have been removed and deposited in the neighboring valleys and low grounds. Here were collected, not only the largest quantity, but the greatest variety of rocks that were found in any part of the island.

We will now enumerate the different depths at which the rock has been reached by borings for water, or for other purposes, in different parts of the island which are covered by alluvium or diluvium. Most of these borings were commenced in this city many years ago by Mr. Levi Disbrow; and the same business is successfully conducted by his son, Mr. John Disbrow, from whom most of the subjoined facts were obtained.

Commencing at Corlear's hook, we find a shaft was sunk at Mr. James P. Allaire's works, in Cherry-street, about 80 feet through diluvium, stratified sands, clays, or gravel, without reaching the rock. Again to the westward about half a mile, at the foot of Jefferson-street, the rock was reached through 10 feet of diluvium, and 40 feet of stratified sands, and gravel alternating with clays.

At Fulton market a shaft was sunk through 15 feet of artificial ground, then 115 feet of stratified sands, blue clay and river mud alternating, and the rock was struck at the depth of 130 feet.

At Holt's Hotel, a few rods north of the last mentioned place, a shaft was sunk through 126 feet of strata like those at the market, and the rock reached through a bed of gravel, and the shaft sunk 500 feet into the rock, which is gneiss with veins of quartz and granite; 200 feet of the upper part of the bore is a three inch hole, and the remainder two and a half inch. The water obtained from this well was at first tolerably good, and promised to be very serviceable, but since has

very much deteriorated, and is now said to be even more saline than that of the neighboring river.

On the west side of the island, at Washington market, which is on the west side of Washington-street, between Fulton and Vesey-streets, a shaft was sunk 10 feet through artificial earth, 50 feet through river mud containing decayed vegetable matter, sands, clays, &c. in thin alternating strata, 10 feet of sands and gravel, when the rock was reached at 70 feet from the surface.

Again, at the corner of Grand and Wooster-streets, a shaft was sunk 40 feet through artificial earth, then 20 feet of mud, clays, and sands highly charged with decaying vegetable matter; then 6 feet of fine blue clay; and lastly, 6 feet more of coarse sand and gravel, when good water being obtained, the borings were discontinued at the depth of 72 feet from the surface. This depth was considered as at, or at least as very near, the surface of the rock, from the fact that in almost all cases where the rock was reached at great depths through similar strata, it was found covered with a bed of gravel or sands, like that above mentioned.

In College place, directly north of Columbia College, which is on more elevated ground than the market, the rock was reached at the depth of 80 feet, through 20 feet of diluvium and 60 feet of stratified sand and gravel alternating. If we follow the high range of grounds in a longitudinal direction, as in the neighborhood of Broadway, though we have fewer data from which to judge, yet it is believed that the rock here approaches nearer the surface than in the places above mentioned. This is inferred from the fact that the direction of Broadway corresponds with that of the strike of the strata, and is generally more elevated than the grounds on either side of it, and the contour of the rock follows, it is believed, that of the loose earth which covers it.

At the old rock well near Trinity church, the shaft was sunk 26 feet through diluvial gravel and sands, where the rock was reached, though not penetrated, and good and permanent springs of water obtained. At the City Hall the shaft was sunk 90 feet to the rock, but is in the district of the Collect, (see vertical section No. 1.) The celebrated well, corner of Bleecker-street and Broadway, is 448 feet deep; 42 feet through stratified sands and gravel, and 406 feet in solid rock, having the usual character of the gneiss of the island. The bore of the shaft is 7 inches diameter, and yields 120,000 gallons in 24 hours, according

to the statement of Mr. D. senior, who made the borings, and who also states that the water rose within 30 feet of the surface.

The shaft of the city reservoir in 13th-street, a few feet east of Broadway, is 113 feet deep and 17 in diameter, with 2 adits at bottom, one 75, the other 100 feet long. The rock was reached at about 20 feet.

In the same street, a few rods west of Broadway, the rock was reached at the depth of about 3 feet, approaching in one place very near the level of grading. At 16th-street, corner of 2nd, 3rd, and 4th avenues, the rock appears, and the soil as we go northward continues to grow thinner and thinner.

As we approach the East river from any point in the middle of the island, between 1st and 20th-streets, the rock dips down to a depth of 90 or 100 feet below grading, as evinced in the shaft sunk in this part of the city. In conclusion, the diluvium and stratified sand and gravel, it appears, extends on the west side of the island as far as 31st-street, and on the east side to 16th-street; and notwithstanding this formation is found in every other section of the island, it is in comparatively small quantities and needs not a particular description. The mineral character of these materials will be noticed in the description of the boulders.

IV.

Alluvial Beds and Valleys on the Island.

There are three principal beds or valleys of alluvium that demand particular description. The first lying in the very centre of the city, includes nearly the whole length of Centre-street with Elm, on the west, and Orange and Mulberry-streets on the east, to the neighborhood of Canal-street. This valley was formerly called the Collect, as it was a receptacle for the draining of the adjoining higher grounds. In some portions it was a mere quagmire, and in others a collection of stagnant water 50 or 60 feet deep, and is said by some of the oldest citizens to have had an outlet communicating with the East river along what is now called Roosevelt-street; and another, with the Hudson across the Lispenard meadows, crossing Broadway at what was then called the stone bridge, (now corner of Broadway and Canal-street.) The Lispenard meadows extended from Broadway to the Hudson, and from the vicinity of St. John's church to Spring-street on the north, including the range of Thompson, Laurens and Wooster-streets.

This first valley being a fresh water alluvion, and a quagmire originally, was of great depth, as has been recently proved by soundings made by Mr. Disbrow, in the place now occupied by the Halls of Justice in Centre-street, between Franklin and Leonard-streets, where iron rods were sunk 40 feet through artificial earth, 30 feet through black mud, 5 to 10 feet of blue clay, then a bed of gravel resting on the rock. Still farther south, at the Manhattan water works, on Centre, between Reade and Duane-streets, seven shafts were sunk 30 feet each in coarse diluvial gravel without reaching the rock. The water supplied by the Manhattan company is by no means the best in quality, but is used for want of better in culinary operations in a considerable portion of the southern part of the city.

The black mud brought up from the lower part of the strata of the Collect was as salt as the waters of the river, though very good water was obtained at a higher level on the outskirts of this valley. This fact is generally explained by considering the water from the gravel beds bordering on the valley as that drained from the surface of higher grounds; while that from lower strata, as from the black mud above mentioned, was derived from the river either directly or indirectly, and being heavier retained its place at the bottom.

The second alluvial valley lies on the east side of the island, and includes what was formerly called the Stuyvesant meadows, and all the low ground extending southward to the vicinity of Corlear's hook, or from 21st street on the north to Delancy-street on the south, and from the river on the east to about half a mile westward; this last boundary varying somewhat in its distance from the river in different portions of it. This region is throughout a salt marsh, and was formerly to a considerable extent covered by the tide at every flow, but is now shut out by dykes and filling in of the streets. The strata composing this alluvion are mostly alternations of sands, clays and mud, and beds of sand or gravel resting on the rock, which last is from 90 to 100 feet below the grade level surface.

The following are some of the results of borings made in this alluvial district. At the corner of Fifth-street and Avenue D, a shaft was sunk which reached the rock at the depth of 109 feet.

At the Dry Dock another was sunk, which came in contact with the rock at the depth of 130 feet, and penetrated it 200 feet.

At the corner of Houston and Lewis-streets the rock was reached at 94 feet. At the corner of Houston and Avenue D, at 96 feet, and at

the corner of Seventh and Lewis-streets the rock was reached at 93 feet. And at the corner of Seventh-street and Avenue D, it was reached at the depth of 100 feet. In these borings it is evident that the rock dips down on the east side of the island to about 100 feet below the grade level of the streets, and that about the same depth of alluvial deposits have accumulated, and most of them below tidewater mark.

The third bed of alluvium is that already referred to under the name of the Harlem and Manhattanville valley; the form of which approaches that of a scalene triangle, having the longest side on its southern borders, and extending from the village of Manhattanville on the Hudson to the termination of 94th-street on the East river; its shortest side from Manhattanville to the northern limit of Harlem village, near 130th-street; and the remaining side from the last named point on the north to the termination of 94th-street on the south. The width of the island at this place is about two and a half miles, and the length of the valley east and west the same, while its extent north and south is about two miles. The strata throughout the valley are alternations of sands, loam and gravel, generally in strata, but sometimes in conical hills thrown together in great confusion; and when this is the case, it is gravel and pebbles rather than sand or loam. The gravel and pebbles predominate towards the western portion of the valley; sand and loam in the eastern. Boulders are less abundant in this than in most other portions of the island.

Comparatively few excavations or borings have been made in this valley, consequently we have fewer data for determining the depth of earth covering the rock. In the northern part of Harlem village at the corner of 4th avenue and 129th-street the rock appears, and has been removed by blasting; and in a number of other places in the vicinity it approaches the surface or within a few feet of it; indeed it is inferred that the whole valley is a bed of alluvium comparatively shallow, inasmuch as the rock appears from 10 to 20 feet above the surface, both to the north and south of the valley, and immediately on its borders.

The extreme eastern portions, and especially the southeastern parts, are a salt marsh, which, along the borders of Harlem creek, approaches the 3rd avenue; but as few, if any, excavations have been made in it, little can be said of its geology.

Besides the above mentioned alluvial beds, others are found in different portions of the island, but they are so inconsiderable as to require no particular description.

There is, however, a prolongation of the Harlem and Manhattanville valley, which extends northward and embracing the 8th avenue till it strikes the Harlem river at McComb's dam. It consists generally of sand and diluvial loam, and is almost a perfect level; few boulders are to be seen on its surface, except on its northernmost part, where they are found in great abundance.

V.

Boulders—their sources and abundance in different parts of the island.

The following are the principal varieties of rock:

1. Greenstone in all its varieties.
2. Red and gray sandstone, and their varieties.
3. Serpentine like that at Hoboken.
4. White primary limestone like that at Kingsbridge.
5. Granite and gneiss like that found on the island.
6. Hydrous anthophyllite like that found in place on the west side of the island.
7. Greywacke like that found in the valley of the Hudson above the Highlands.
8. Limestone like that of the Catskill mountains.
9. Ferruginous sandstone or jasper rock, like the sandstone underlying the Palissades near Fort Lee.
10. Clay stone, supposed to be from the same source as the last.
11. Actynolite, supposed from the anthophyllite locality.
12. Kyanite—this has been found in small fragments, but I am not aware that it has been traced to its locality.

The abundance of the several varieties of rock above enumerated, is very different in different parts of the island. While some are common to every section, others are confined to a particular part; thus, greenstone is found in boulders every where from north to south, and from east to west, while serpentine, like that at Hoboken, is confined to the southern limits. The details of these facts will be found below.

1. *Greenstone.* This in all varieties is perhaps the most abundant rock that is not found in place on the island, yet in boulders is common to every part of it. In almost every instance, they are worn to a rounded form, though it is one of the hardest and toughest rocks known. They are among the largest transported rocks on the island, being from 10 to 15 feet in diameter, and often covered with grooves and scratches indi-

cating the mechanical violence to which they have been exposed. This rock is not found in place on the east side of the Hudson, but is the chief rock on the western shore, from Tappan bay on the north to Bergen hill on the south; and as all the varieties found in place there can be selected amongst the boulders here, the necessary inference is, that this locality is also the source of the greenstone. Specimens forwarded.

2. *Red sandstone*, like the greenstone, is common to every part of the island, being found from Corlear's hook to Kingsbridge, but most abundant towards the former place. These boulders vary considerably in appearance, as well as in size. Though occasionally consisting of coarse pebbles, they are generally fine grained, of a red or grayish red colour, and distinctly stratified. I have found some that measured 9 or 10 feet in diameter. This rock, like the greenstone which it accompanies along the Jersey shore, is not found on the island, nor on the east side of the Hudson nearer than the valley of the Connecticut.

There are two other varieties which I have referred to the red sandstone formation, but on account of their peculiar character as boulders, I will describe them by themselves under the name of ferruginous sandstone and claystone. Specimens forwarded.

3. *Serpentine*, like that at Hoboken, is common in the southern, but rare in the northern parts of the island. In speaking of serpentine, we shall make a distinction between that variety found in place at Hoboken, and that found at the anthophyllite locality on the island, which approximates to serpentine in character, but is harder and is mixed with limestone. These boulders are much more common in Brooklyn than in this city, except perhaps the region of Corlear's hook. This might be expected, taking for granted that they were transported from Hoboken, which seems to be a necessary conclusion, as no other locality of this variety is known in the vicinity. Besides, the direction of the diluvial grooves being from northwest to southeast is such as would carry the materials from Hoboken to Corlear's hook, and the east part of Brooklyn.

4. *White or Primary Limestone*. Boulders of this material were found some years ago in cutting away the hills at Corlear's hook, and in a number of places on the east side of the island, between the city and Kingsbridge; but I have neither seen nor heard of any being found on the western side. The principal places where I have found this rock, are on the 4th avenue near 120th-street; at the 7th avenue, north of the village of Harlem, near 142nd-street; at McComb's dam, at the

northern termination of the 7th avenue; and in a number of places in the valley of the Harlem river, between McComb's dam and Kingsbridge. Now the nearest locality where this rock is found in place, is at Kingsbridge, and I have no doubt the boulders in question came from this place; but had they been transported in the general direction of the current shown to be northwest and southeast, instead of reaching their present location, they would have been carried across the Harlem river, and have been deposited in the range of grounds lying about midway between Harlem and Westfarms. Specimens are forwarded.

5. *Granite and gneiss*, especially the latter, being abundant in every part of the island except the northern extremity, boulders of these might be expected to be more numerous than of any other materials; yet I think greenstone boulders are quite as numerous, take the whole island together, as granite and gneiss. The largest boulders I have seen of the latter kind, measured in diameter 12 and 18 feet, and are equally common in all parts south of the Harlem and Manhattanville valley. The granite, which exists in veins in the gneiss, is mostly on the west side of the island; and this when torn from its place and transported by a northwest current would naturally have been distributed over the eastern parts, and even as far as Long-Island. A number of very large ones were excavated between 1825 and 1830, in the vicinity of Corlear's hook, some of which were peculiar in character. One I well remember lay many years on the south side of East-Broadway, near its junction with Grand-street. It was a gray granite of coarse texture, with tabular crystals of black hornblende 3 or 4 inches in diameter interspersed throughout. It was 18 feet long, 16 broad, 8½ high. This is the largest boulder I have seen on the island, but those from 10 to 12 feet diameter are very common.

A large boulder of granite, 11 feet in diameter, and though somewhat rotund, has a rough and angular surface, as though it had suffered little from mechanical violence, rests on the gneiss rock on the east side of Bloomingdale road, from a quarter to half a mile south of the village of Manhattanville, and at the southwest corner of a Mr. Stevens' house, between it and the road. The whole rock on which it rests is covered with diluvial grooves, and a very large one 3 inches deep and 18 wide between the road and the boulder, and terminating at the latter, seems to have been the result of the movement of this huge mass. Specimens are forwarded.

6. *Hydrous Anthophyllite*. This rock has been familiarly known for many years in this vicinity under the name of *radiated asbestos rock*, but was known only as a boulder found in considerable abundance in various parts of the city, and as far north as 15th or 20th-street. Its geological place was not, however, known at that time; and as its true mineralogical character was somewhat doubtful, Dr. Torrey sent specimens of it to Professor Thomson, of Glasgow, who analyzed and pronounced it anthophyllite; but as it contained a much larger proportion of water than had usually been found in this mineral, Dr. Torrey proposed to prefix the term *hydrous*, which has been generally adopted. This rock has been found in place on the west side of the island, between 10th avenue and the Hudson, and between 57th-street on the south, and 63rd-street on the north. Here the strata are nearly vertical; the strike is NNE; the width of the bed at right angles to the strike varies from 3 to 30 rods. It commences at 57th-street, within 30 or 40 feet of the avenue, and runs obliquely to the streets crossing the 11th avenue near 60th-street, and runs out at the river on 63rd-street. It is remarkable that the granite lying on the west, and the gneiss on the east of the rock in question come in complete contact with it without intermixing. So remarkable is the line of separation on the side next to the gneiss, where there is the best opportunity to examine the two, that within the space of three inches each rock possesses all of its own peculiarities, with none of those of its neighbor. The mineral character of this rock varies much in different parts of the bed. In the southeast portion where it approaches nearest to 10th avenue it exhibits little or no stratification, is very dark coloured, and has a tabular structure. In the same vicinity are found masses of serpentine and limestone intermixed, exhibiting a porphyritic appearance, the serpentine appearing green and the limestone white. Again near the middle of its course, or near where it crosses the 11th avenue, it becomes lighter in colour, more fibrous and scopiform in structure; but the fibres are large, and in some instances approach the character of actynolite. Still lower down, following the strike towards the river, the same mineral character continues, except that the fibres are still finer, and the whole texture becomes softer and more like steatite; so that many years ago, before the rock was known to geologists, it was attempted to work this bed for a soapstone quarry, to be applied for similar useful purposes; but the material being too hard, the project failed. This rock has been found in boulders in all of the southern part of the island, and some are very large. On the west side they extend from the rock in place to 15th-street. In the middle division they have been found

[Assem. No. 275.]

from 48th-street on the north to 14th-street on the south, and on the east side from 24th-street to Corlear's hook.

On the south side of 14th-street, between Bowery and 3d avenue, is a boulder of this rock 15 feet long, 12 broad, and 6 high, containing on its surface abundance of diluvial scratches running longitudinally.

Again, 30 feet west of 3d avenue, on the south side of 16th-street, and 40 feet distant from it, is another boulder, 13 feet long, 8 broad, 7 high. It is uniform in texture, like that on 63d-street, in place, and is covered with scratches running longitudinally.

Another 12 feet long, 8 broad, and 8 high, is lying in 25th-street, about 20 rods west of 4th avenue, covered with scratches in every respect like those of the last.

Now had these boulders (which, I doubt not, have all been derived from the same rock,) followed strictly the course of the current indicated by the diluvial grooves on the island, they would have been found along the Bloomingdale road, near the 8th avenue, and from thence eastward to Kipp's bay and the alms-house, and possibly somewhat lower down; instead of which, they have been carried much farther south, to Corlear's hook, and even on Long-Island.

I will here remark, that I strongly suspect there are other localities of this rock eastward of this island; for boulders of the same character resembling most perfectly specimens of this island, have been found at West Farms, New Rochelle, and Sawpits, which could scarcely have been transported from the locality on this island.

7. *Graywacke*—Which is common in the valley of the Hudson. I have seen specimens found many years ago, in grading the streets at Corlear's hook. These specimens closely resemble the rock brought to this city for the purpose of flagging the sidewalks, from Coeymans and Coxsackie, also from Esopus creek, but as no specimens have come to my observation recently, or since about 1830, I cannot speak from personal knowledge.

8. *Limestone, like that of the Catskill or Helderbergh mountains*, abounding in *productus*, has been found at Corlear's hook, and in other places in the southern part of the island. I have a single specimen in my cabinet, obtained at that place in 1826, at the depth of 40 feet below the natural surface. It was then a boulder 2 or 3 feet in diameter, and has been distributed so that but a small fragment now remains. I

discovered it, and removed it to my cabinet, and considered it as bearing such strong evidence of its source, that I shall forward it to be preserved in the State cabinet at Albany.

9. *Ferruginous Sandstone or Jasper rock*, like that found in place underlying the Palissades, near Fort Lee.

This rock which is one of the most abundant next to greenstone and granite, in the south part of the island, I have not found north of the Harlem and Manhattanville valley. It is most abundant between 13th and 20th-streets, and between 2d and 4th avenues. This rock, when first noticed, was supposed to be a ferruginous quartz in a state of disintegration; but on a closer inspection, an obscure appearance of stratification was observed, and the component grains were found rounded and often transparent, and cemented together by a large amount of oxide of iron. In some specimens it is difficult to identify the granular structure on account of the abundance of the cement, and the advanced stage of decomposition in which it is found; in others, there is so intimate a union between the parts, that the whole seems to be one entire mass. There are others, again, where the cement puts on the appearance of jasper, and hence the name of jasper rock, which has frequently been applied to it.

In searching for the geological place of this rock, I am satisfied I have found it underlying the Palissades in the neighborhood of Fort Lee, where the red sandstone comes out under the Palissades very near the water's edge, and exhibits a great variety of character. Specimens of this rock are forwarded.

10. *Claystone*, supposed from the same formation as the last; they are distinctly stratified, and have a clay colour. They are often quite hard and slaty in structure. Specimens of this rock are forwarded.

11. *Actynolite*, supposed from the anthophyllite locality. This variety has been found in boulders at Corlear's hook, and in other places in the southern part of the island. One of 3 or 4 feet in diameter was discovered in 1826, near the corner of Monroe and Montgomery-streets. I preserved a single specimen, and remember distinctly the character of the whole mass; and on comparing the specimen in my possession with the varieties of anthophyllite in place, I doubt not that all the specimens of actynolite on the island have been transported from this source.

12. *Kyanite*. All the specimens of this rock that have come to my knowledge were in loose fragments lying on the surface, inferior in qua-

lity. I found two specimens in 1826 near Kipp's bay, but have heard of none more recently, nor have I been able to trace it to its geological place.

VI.

The Minerals enumerated : 1st. Those peculiar to the island. 2d. Those from other sources.

1st. Those peculiar to the island.

1. *Quartz Crystals.* (Inferior specimens,) small crystals in the Harlem rail-road cut under the track in veins of gneiss, about 122d-street.

2. *Rose Quartz.* (Inferior specimens,) from the same place; the locality being covered up no more specimens can be obtained.

3. *Epidote.* Very small crystals of a deep green colour, in hexagonal prisms in veins of half an inch wide in gneiss, at 38th-street, on the banks of the East river, in the southeast part of a gneiss quarry.

4. *Tourmaline.* In hexagonal prisms in granite beds or veins in various parts of the island. Many fine specimens were obtained in opening the Harlem rail-road.

5. *Brown Garnets.* With 24 trapezoidal faces, very imperfect; abundant in the gneiss on the shore of the Hudson, between 42d and 50th-streets, and in boulders in every section of the island.

6. *Hydrous Anthophyllite.* Already described, very abundant.

7. *Serpentine.* Intermixed with white limestone and of granular structure, described with the last, and from the same locality.

8. *Red Stilbite.* In small quantities in veins of gneiss; in small scopiform fibres of a reddish yellow colour. From the rail-road cut near the tunnel. The locality is exhausted.

9. *White Pyroxene.* In four sided tables in veins in limestone at the abandoned quarries at Kingsbridge, at about 208th-street, five rods west of the Kingsbridge road.

10. *Fetid Feldspar.* Of a bluish white colour, in tabular masses in limestone at Kingsbridge, Thompson's quarry near 196th-street, and about 100 yards west of the road.

11. *Iron Pyrites.* In exceedingly small cubic crystals throughout the island, in the gneiss and in the limestone at Kingsbridge.

12. *Tremolite, white.* In the abandoned quarries of limestone at 208th-street, west of Kingsbridge road.

2d. Those from other sources.

1. *Mesotype*. In cavities and veins in greenstone.
2. *Datholite*. From the same source.
3. *Apophyllite*. Also from same source.
4. *Chlorite*. Same source, found in small quantities.

All of this last class have been found in small quantities in veins in the boulders of greenstone, barely sufficient to determine their characters.

VII.

Diluvial grooves and scratches.

From the preceding remarks on the transported materials of the island, and from observations on the geology of the vicinity, it is quite certain that an immense force has been in action at a former period and has carried a vast amount of mineral materials from their original beds, and spread them over a large area. That water was in some way the agent is the united opinion of geologists, but the circumstances attending it, the immediate cause or causes of its movement, and the precise epoch in which it took place, it would be difficult, if not impossible, in the present state of our knowledge, to determine.

My remarks will therefore be confined rather to the force and direction of the current than to the causes which produced it.

The direction of the current is ascertained by that of the grooves and scratches left on the solid rocks; and its force, by the size and quantity of the fragments, and the distance and elevations over which they have been transported.

The term *grooves*, as here used, applies to all the furrows that are an inch or more across; the term *scratches* to all those less than an inch across; the word *furrow* without reference to size, but as a general term.

Diluvial grooves and scratches have been found in every section of the island, from 16th-street on the south, to 200th-street on the north, (or to the southern termination of the limestone,) and from the banks of the Hudson on the west, to Harlem river on the east.

The furrows generally are most distinct where the rock has been recently uncovered; and least so where it has long been exposed to the action of the elements. They have been found on the highest rocks, and at the lowest tide water marks, being a difference of more than 100 feet perpendicular height. It is evident, therefore, that if these furrows were the result of a single diluvial action, or a single deluge, the

current was more than 100 feet in depth. The furrows are always most strongly marked on the northwestern slopes of the hills, and least so on the southeastern. In many instances they are very distinct on the western and northwestern slopes, extending to the highest point of the rock, but no traces are to be seen on the eastern and southeastern slopes, although both slopes are equally exposed.

Direction of the Furrows. Observations of the diluvial furrows were made in between sixty and seventy different places on the island. Taking together the whole series of observations, the general course of the current was from northwest to southeast, or north 45° west, but varied in the extremes from north 25° west to north 48° west, making a difference of 23° .

Of the whole series of observations, thirty-nine were north 45° west, twelve varied from north 25° west, (seven being north 35° west,) two were north 48° west, and a few scattering ones, varying from north 35° west to north 45° west.

Abundance of the Furrows. The furrows occur most abundantly in the middle portions of the island, between the city and the Harlem and Manhattanville valley, somewhat less in the western, and least of all in the eastern.

Direction of the Furrows in particular neighborhoods. Half of all the places where the furrows were noticed were in the middle portion of the island in the line of the 8th avenue from 60th-street to 105th-street, where without exception the direction is north 45° west. About one-fourth of all are on the west side, and vary but little from north 35° west, and about one-eighth on the eastern side, where the direction varies from north 25° west to north 35° west. In connection with this subject, I have examined the surface of the greenstone on the neighboring shores of New-Jersey, and find their grooves and scratches abundant, and their general direction is north 45° west. Hence it appears, that the diluvial current which once swept over this island from northwest to southeast, on reaching the western shore was deflected southward, as by the action of some force at a right or some other angle to its course; and that the same current, before it reached the middle of the island, again assumed a southeasterly direction, but was again diverted southerly on approaching the eastern shore. That some portion of the current was diverted southerly on reaching the western shore of the island, is evident, not only from the diluvial furrows, but from the boulders of anthophyllite found in large numbers in the lower part of

8th avenue near 15th-street, a distance of two miles in a SSW direction from the only locality whence they could have proceeded.

Again, the white limestone of Kingsbridge has been distributed along the eastern shore of the island, in a direction almost due south of the only locality in the vicinity where it is found in place; whereas had they been carried in the general direction of the current, they would have been deposited eastward in Westchester county, as before stated.

Magnitude of the Furrows. The size of the furrows varies in the same and in different localities. Sometimes they are the finest scratches, not more than a line in diameter horizontally, and of the smallest appreciable depth; from this they increase to grooves 4 inches deep and 18 inches in horizontal diameter. In a few cases, they are furrows, or rather troughs, more than 2 feet wide and 6 or 8 inches deep. A case of the latter kind occurs on 8th avenue, between 79th and 81st-streets; and one of the former on the west side of the island, on the very banks of the Hudson, 500 yards north of Mr. John H. Howland's country seat, (near 97th-street.)

Convenient places for examining the Diluvial Furrows. The nearest places to the city for examining the furrows are at the junction of 22d-street and 1st avenue, south of the alms-house yard; and again about half a mile northward at Kip's bay, at the junction of 1st avenue and 35th-street. Both of these localities will soon be destroyed by grading the streets.

Some of the most interesting localities have been made known by cutting through 8th avenue from Bloomingdale road at or near 60th-street to Harlem and Manhattanville valley, at 105th-street. These localities are on both sides of the avenue, and very conspicuous.

Another, equally interesting in many respects, is on the banks of the Hudson, west of the Bloomingdale road, about six miles from the city, and about 600 yards northwest of Burnham's hotel.

The interest excited by this locality arises from the fact, that the furrows ascend from beneath the lowest tide water up an elevation of 70 feet in 300 or 400 feet distance, requiring a force greater than that of any current with which we of modern days are acquainted.

Respectfully submitted,

L. D. GALE,

Assis't Geologist First District N. Y.

THIRD ANNUAL REPORT

Of E. Emmons, of the survey of the Second Geological District.

To his Excellency, WILLIAM H. SEWARD,
Governor of the State of New-York:

SIR—Owing to many inaccuracies in the county maps of the Second Geological District, and to the incomplete state in which the original surveys which constitute the foundation of those maps were left, especially that portion of the section which embraces the origin of many of the great water courses of the State, I was directed by his Excellency, Wm. L. Marcy, to attempt those corrections and supply those deficiencies, which are of the most importance to the geological survey.

This additional duty, while it has interfered with, and retarded, to a certain extent, the prosecution of my appropriate labors, has not caused at any time their entire suspension. The consequence has only been, that I have not been able to complete the examination of so much territory as I should have done had my attention been directed solely to the collection of geological facts.

It remains to be shown in the final result whether this course was judicious, though it can hardly be doubted that it is important that the proposed geological maps should be as full and accurate in geographical details as possible.

During the first season of the survey, Mr. Hall and myself ascertained the fact that by far the most elevated portion of the State is situated in the Second Geological District.

This circumstance gave an unusual interest to this section, and has induced already many gentlemen to visit this region of mountain; and it will undoubtedly in a few years become a favorite place of resort to persons of leisure. The location, too, of the Adirondack iron works,

in the heart of this district, is a matter of great interest to the public, forming the nucleus of a great establishment, which will in a few years change the entire character of this region. Anticipating such a result, I was early induced to give topographical observations a prominent place in my labors; and I have been urged on by the consideration that this field is the great water shed from which flows in all directions, the waters of one-half of the State, and that it embraces a range of mountains whose peaks overtop by some 2,000 feet the great Catskills, widely famed as the Alps of New-York.*

Besides the importance of possessing correct geographical and geological maps, considerations connected with science in general have had their influence in directing my attention to the topographical features of the section committed to my charge. These in their aggregate, it is believed, will overbalance any loss which the geological survey will sustain in consequence of a partial diversion of labor in this particular.

It will be unnecessary, as I conceive, to give a detailed account of the measures adopted to accomplish this object. I deem it sufficient to say that I have been able to determine the position of the highest mountains in Essex, Warren and Hamilton counties, together with the course or bearing of the Northern Highlands, the zone or belt which they traverse, and the points at which the subordinate and primary range terminate.

To obtain my results, I have been obliged to travel over more territory than would have been required to have completed the necessary geological observations; hence my labors have increased; but that no lack of service might appear at the close of the survey, I have felt the necessity of improving every favorable moment for observation.

In selecting the subjects of discussion for the third annual report of my district, I have determined to confine myself to a few topics, and mostly to those of a practical kind, or to those most useful to the producing classes of community; though it is difficult to avoid the discussions of theoretical points when they appear in connexion with economical geology; and besides, it is often the case that those very points are of more value than the insulated facts from which they are inferred,

* In a report to the Legislature this present session, Mr. E. F. Johnson, the engineer of the Ogdensburgh and Champlain rail-road questions the accuracy of the measurements of Mount Marcy. In reply to his suggestion, I shall merely remark that it is quite doubtful whether the mountain in question is distinguishable from those of the same group, especially by one who has never visited the interior of this section; and if visible, his measurement is not entitled to consideration except as a very imperfect approximation.

inasmuch as they may lead to the establishment of general laws. For instance, I established the fact clearly in my first annual report, that the boulders of hypersthene rock which are scattered over the surface of the soil in Orange, Schoharie and Montgomery counties, could be traced to their parent rock in Essex county, from which I drew the inference that the current which transported those boulders flowed from north to south. The practical application of the inference is, that when searching for mines of iron, lead, coal, &c. by fragments of the veins or beds which have been more or less broken up by violence, we are always to proceed from south to north under the guidance of those fragments. The value of this inference is supported and confirmed in numberless instances.

Considering agriculture of the first importance to a State and community, we are gratified with every discovery which favors its prosecution and increases its products and profits.

Next in importance are those which increase the quantity of the raw materials for the use of the arts, the manufacturing of which employs directly or indirectly a large portion of the human family. Upon the abundant and cheap supply of those materials, much depends for the prosecution of the great system of internal improvements, the profits and success of which are, in a great degree, dependent on the Geological Surveys now in progress.

Last, though not the least in importance, are those discoveries of a scientific nature, which form the data on which natural phenomena are explained, and which constitute the basis on which may be founded the early history of the earth.

The latter, too, afford the most rational means for gratifying the curiosity of inquiring minds on subjects which relate to events of the greatest magnitude and importance, and which at present are regarded by the good and great, as entitled to occupy a high place in the instruction of youth, and as well calculated to preserve and improve the morals of community.

With these preliminary observations, I shall proceed to the discussion of the principal subjects of this report.

Porcelain Clay and Feldspar.

Among the natural productions of the Second Geological District, are *porcelain clay* and *feldspar*. Both substances are valuable, as they

form the essential materials in all the finer kinds of pottery. They are at least the most important elements in the China, French and English porcelain; they also enter into the composition of the common Liverpool ware, but in a smaller proportion than in the French or English porcelain.

These substances occur at many localities in the United States, but generally they are not sufficiently pure and free from colouring matter, to render them objects of value; especially is this the case with *feldspar*. It is abundant, but contains frequently too large a proportion of the metallic oxides, which in the process of fusion, imparts colour to the glazing or enamel, a circumstance which entirely destroys its utility and value in this art.

The localities of porcelain clay which fell under my notice, were in Athol and Johnsbury, in Warren county, and Minerva, in Essex.

The mode in which it occurs is in layers more or less distinct, or in layers interlaminated with those of different colours, as yellow, red and brown. At first view, they might be mistaken for ochre beds; still the peculiar reds and browns are entirely different from the oxides of iron generally termed ochres, and their nature becomes apparent from their association with the white variety.

It is remarkable, that the latter which is in the midst of the coloured portions of the bed, should have been deposited without any intermixture of the oxides so strongly developed in the adjacent portions.

Its colouring matters, I find, consists of a mixture of the oxides of iron and manganese.

The white variety is soft to the touch, and free from that harsh and meagre feel common to some varieties of this species of clay. This peculiar soft feel is owing probably to an intermixture of talc which occurs in it in the form of thin white scales.

My opinion of the excellent quality of this clay has been confirmed by an experienced artist, D. Henderson, Esq. of Jersey City, who has been engaged for a number of years in the manufacture of the blue or Liverpool ware. It is but just to remark, that at this establishment was made the first dining plate in the United States, and that the beauty of the articles now manufactured at this establishment is equal to any of the imported wares from Liverpool.

It is impossible to speak at the present time of the quantity which those localities will probably furnish. I was able to expose only a small portion of the beds which I visited; it would not be safe to make any estimate on those partial excavations. There are circumstances, however, which are favorable to the general impression which prevails in that vicinity, that the substance is abundant. One or two facts in particular, go to corroborate this position; for instance, its occurrence in numerous places, and which are scattered over an extent of country of 15 or 20 miles in length. It would be an anomaly, if throughout so much territory, there should not be an abundance of this valuable material.

This variety of clay is produced by the disintegration and decomposition of granite. Those granites, which are of a coarse texture and contain large lamina of mica, or are intermixed with scales of talc, are the most subject to this change. In the granite of Athol and Johnsburgh, there is more or less of pearl white talc, an association which I consider an advantage to the clay; its presence will increase the fusibility of the silex and alumine, and impart a rich porcellaneous aspect, or a greater translucency to the body of the ware; besides it adapts it for glazing and forming enamels for the common earthen ware, even if it is not employed for the production of the finer varieties of porcelain. In fact, it is of great importance that other materials besides salt, lead and the metallic oxides should be employed for glazing even the commonest articles of pottery, and the discovery of some substance which may be used as substitutes for those oxides, which are so readily acted upon by the weaker acids in domestic economy, has long been a desideratum. It remains, therefore, only to determine the truth of the conjecture, that of its abundance, to render it an important addition to the natural resources of the State.

The porcelain clay beds furnish us with some geological facts which are worth at least a passing notice. I found that they all contain concretions of silex, and of the oxides of iron and manganese.

The silicious nodules belong to the same variety of quartz which is usually denominated hornstone, and like this substance, often contains cavities lined with crystals of quartz, some of which appear under the primary form of the species, a form much sought for and esteemed by mineralogists on account of its variety. They are small, and only large enough to be seen distinctly by the naked eye.

The concretions are evidently masses of secondary formation as it regards the bed in which they occur; and their appearances, together with

the circumstances connected with their position, are such, that we are obliged to consider them as having been once in solution. Chemists are familiar with the fact that water under certain circumstances freely dissolves silex; besides, it is well known that it is held in solution in the hot springs of Iceland, St. Michael's and many others in the vicinity of volcanoes; still, it is an insoluble substance after it has been once separated from water by precipitation, though in a state of minute subdivision. Again, silex becomes soluble by the assistance of the alkalies, potash and soda, especially when aided by heat. But the conditions under which it occurs in those beds are such, that no satisfactory rationale offers itself in explanation of its solution. The following is the only one which occurs to my own mind, viz: that the silex is derived from the feldspar, and that by its union with the potash it becomes soluble, either in the water of crystallization or of absorption, forming at one stage of its decomposition a silicate of potash; this compound, by subsequent reactions, suffers an entire separation of its elements, which finally results in the union of the particles of silex in the form of crystals or crystalline masses, and the entire removal of the potash by solution. If this is the correct rationale, we are obliged still to maintain that only a part of the silex is employed in forming those nodules, for a portion still remains in mixture or combination with the alumine. The silex or quartz of the granite appears in coarse grains, diffused irregularly through the beds.

Whatever rationale we may offer in explanation of this peculiar decomposition, we are furnished with a beautiful instance of a natural and spontaneous decomposition, or analysis of feldspar, as complete and perfect as can be obtained in the laboratory of the chemist; so perfect indeed, that we are able to perceive each element side by side in each of those repositories, with the exception of the potash which is removed in consequence of its solubility in water.

To assist our minds to comprehend more readily the law of those movements, which result in the formation of the concretionary masses, we may consider all the elements of the feldspar as forming at one time a plastic moveable mass like paste, and in which there is a perfect intermixture of the materials, or of the elements which composed the feldspar originally. Under those circumstances, all the truly soluble parts would be washed away or removed by infiltration through the earthy materials. Those which remain would be left to be acted upon by molecular attraction, and which would be exerted between particles of the same kind, or more especially between them. This influence would

bring into closer union the particles of silex in the immediate vicinity of each other, and which, by a continuance of the same influence would produce a gradual accumulation of matter of increasing density and firmness, until finally, those movements have been imparted to the whole of the silex contained in the beds. The accumulations commence at different points, which of course constitute different centres of attraction; at each of which there forms a mass of consolidated silex or of hornstone or chalcedony. An analogous change takes place in the porcelain pulp after the materials have been ground and formed into a pasty mass in the vats in case it is suffered to stand long without agitation; for after long repose it is found that concretions of silex have already formed in the paste, indicating the commencement of a series of changes which would finally affect the entire composition of the materials, and which, if suffered to extend would spoil the whole mass for the purposes for which it is prepared.

The oxides of iron and manganese are always found associated with these beds; they occur in two forms; first, as concretions, which have been formed by the same process as the silicious; and second, as colouring materials, which are uniformly diffused through some portions of the deposit.

The oxide of manganese occurs in the original rock from which the clay is formed, in dendritic implantations, occupying the seams between the lamina of feldspar. Those dendritic implantations may have been formed by infiltration of mineral matter from above, or separated from the general mass and transferred by galvanic agency to the surfaces they now occupy. As the granite disintegrates and decomposes, the oxides undergo a partial solution, and together with the silex become in process of time uniformly diffused through the materials composing the beds. Subsequently, affinity brings the particles of manganese and iron together in the form of globular masses, so that we have all the elements of the rock, the silex, iron, and manganese, alumine and silex, each, according to their affinities, in the form of separate independent masses, or in imperfect combination. To carry our views a little farther, we may suppose that the same beds subjected to the action of heat, when another series of actions would ensue, the result of which might be the reproduction of the original rock, or of other crystalline bodies, as the silicate of alumine, iron, and manganese. We have in these changes and transformations, beautiful illustrations of the alterations in state and composition which the solid materials composing these rocky strata undergo by a modification of the force of affinity. We have too, abund-

ance of evidence, that matter, though inert in itself, obeys the impulse of an invisible intangible power, which, though slow in its operations, yet, in the end produces many remarkable results.

Without occupying farther time in the exposition of the manner in which the porcelain clay is formed originally, or of the changes which subsequently takes place in them, I have only to remark in this connection, that the occurrence of those masses of hornstone and chalcedonic quartz, in place, furnishes us the means of solving a geological fact of some importance, as the following statement will show. Over a wide extent of country, embracing a portion of the States of New-York, Vermont and Massachusetts, there occurs small boulders of this peculiar hornstone and chalcedony. They are found loose upon the surface and in the soil, intermixed with other rocks as granitic gneiss and hornblende; but so far as I have observed, they are never found imbedded in a rock; hence their original formation, and their actual repositories were matters of doubt and uncertainty. We have, however, reason to infer that they were originally formed in beds of clay, similar to those of Johnsburgh and Athol, and that currents of water, or some other forces, have transported them from their native beds, and spread them over a wide extent of country.

Before closing my remarks on the porcelain clay of Warren county, I think it possible some of the readers of the geological reports may be interested in the general description of this valuable substance as it occurs in foreign localities, and of those varieties which are employed in the manufacture of this beautiful ware. The Kaolin, or porcelain earth, is derived from the same source, wherever it has occurred. It may always be traced to the coarse granite as its parent rock, and particularly to the disintegration and decomposition of the feldspar. All the ordinary feldspars possess the property of forming an enamel before the blow-pipe, without addition, previous to the change of state which reduces them to the condition of an earth.

But subsequently to this change in consequence of parting with the potash, one of the elements of this mineral, it no longer possesses the property of forming an enamel by fusion; or in other words, it becomes infusible, and remains unchanged when exposed to the highest heat of a furnace. In this remark the petuntze of the Chinese is an exception. In this, the decomposition has not proceeded so far as to effect an entire alteration in its elements, and it still retains the property of the original feldspar, that of fusing and forming an enamel when subjected to a

high temperature. The kaolins are generally meagre to the touch, friable, and unlike the ordinary clays, and do not form a paste with water. The true kaolins are formed of equal parts of silex and allumine, and that they may be employed usefully, and compose this article of luxury and of value in the arts, it is necessary they should be free from colouring matter. Generally, if not always, those clays may be distinguished from all the ordinary clays by scales of mica which indicate their origin, and also by their association in granitic districts. This constant association may often aid us in our searches for this substance, for it is constant in France, in Germany, in China and Japan.

1. *The Kaolin of Saint-Yriex.*

At this place, which is near Limoge, there is found two varieties of clay. The first is called the hard earth, and the other the soapy, or *terre dure*; the other, *terre savonneuse*. The kaolin is found mixed in the quarry with grains of quartz and scales of mica. The grains of the former are separated as much as possible, as they render the clay more infusible.

It occurs in those quarries at Saint-Yriex, in masses about an inch to an inch and a half in diameter. The surface of each mass is carefully scraped from all the coloured portions which may adhere to them. This part of the operation is performed by females. The hard porcelain clay, or that which is much mixed with the coloured portions, is washed after it is broken and thrown into vats, in which it is suffered to remain a short time only, when the quartz and coloured matters subside, the water is drawn off into other vats, in which it is suffered to repose, when the fine particles are precipitated to the bottom. This portion, after it is consolidated somewhat and dried, together with the pure masses which have been selected at the quarries and put in order by females, is sold at Saint-Yriex at 7 francs and 50 centimes per cwt.

The petuntze, which is the feldspar but slightly changed, and still retaining its potash, is not so valuable. This is used principally for the glazing, or for forming the enamel. The porcelain quarries of Saint-Yriex were discovered in 1760. They furnish at the present time most of the materials for the manufacture of this ware for all France, though there are many localities of this substance in this country. It is well known that the French porcelain is far superior to the English, and in fact to any other; and it has attained such a degree of perfection, that it is considered the *ne plus ultra* of the art.

2. *Kaolin of Siberia.*

Similar to those of France, are the quarries of porcelain earth of Misjœk, Jelowoi and Jelandishik, in the province of Isetsk, in Siberia. The establishment for washing and drying it, was founded in 1750. The first operation is performed on a grand scale. A number of tons of the rough kaolin is mixed at once with pure water in vats, which after remaining a suitable time, is drawn off into tubs, from which again it is made to pass through sieves of horse hair, and again it is filtered through those of taffeta or silk. Having passed through these several washings and filtrations, it is then put into the store house, where the whole liquor is suffered to repose and become partially clear; it is then drawn from the large vats by orifices situated at different heights from the bottom. When the earth has attained, in the last vessels into which it is drawn, the thickness of pap, it is again decanted for a third time into tubs disposed according to the state or condition it is in. The kaolin thus purified, is transferred to rooms strongly heated by stoves, disposed on lattice work, and covered or defended by lace from dust, &c. It is afterwards moulded into regular shaped masses of about 40 pounds each. The earth thus prepared, is transported to St. Petersburg, for the use of the imperial establishment. The quarries of Misjœk contain large plates of mica similar to those of Saint-Yriex, in France.

3. *Kaolin of China.*

The vast empire of China furnishes a very great abundance of this valuable earth. There are numerous manufactories of it at Nankin and Tinqu. The period of their establishment is unknown, as well as the mode pursued in the manufacture of it. The borough of Kin-te-tchin, in the province of Kian-si, is the place where the best China ware is made. It appears that as early as the thirteenth century, what is usually called the China ware, was then manufactured at the city of Tinqu.

It is customary in China, to leave the earth exposed to the air for thirty or forty years; it is accumulated and preserved by the father as an inheritance for his children.

In those accumulations, the petuntze undergoes a further decomposition, and finally passes into the same state as the French porcelain earths.

In general, the kaolin forms the base of the China ware, to which is added sulphate of barytes.

The enamel is made of petuntze and feldspar. Besides this, it is said that the pieces are sprinkled with a species of fine earth previous to their painting, which produces a wonderful effect in increasing and augmenting the beauty of the surface, and which lessen also very much the labor of painting.

4. *Kaolin of Vicence.*

There is a beautiful earth at Schio, in the Vicentin, which is known in commerce under the name of *terre de Vicence*. It is a kaolin proceeding from the decomposition of pyritous felspathic rock. This earth was once an object of an active and flourishing commerce; it was formerly even exported to England, but since the government of Venice has given the exclusive privilege to the national manufacture, its exportation has ceased, or has very much diminished.

5. *Kaolin of Saxony and Prussia.*

The manufactory of porcelain at Meissen, in Saxony, is justly celebrated. The earth is found in the vicinity of Scheeberg. The quarries are explored by wells and galleries; they yield only about 400 quintals of earth annually; it possesses the same character as the French, and the mode of manufacture is much the same.

6. *Kaolin of England.*

The kaolin of England is associated with the ores of tin. It is found particularly in Cornwall. This association ought not to be forgotten in this country, as it is well established that the ores of this valuable metal belong only to granitic rocks. The earth in Cornwall presents no characters to distinguish it from the same earth in other countries. It is, therefore, unnecessary to extend my remarks upon it, as they would only form repetitions of what has been already stated.

Besides the kaolin which results from the decomposition of granite, another material has been substituted in the manufacture of porcelain. It is a carbonate of magnesia mixed with a small per centage of silice. It is a white compact earth, and often resembles the white calcareous clays. It softens in water, but does not form a paste with it, except after a long pounding and maceration. It effervesces with acids, and is covered with saline efflorescences, after being moistened with dilute sulphuric acid; when exposed to the blowpipe, it hardens, but does not fuse, except on the sharp corners of the fragments the most exposed to heat. This substance, besides being employed in the porcelain manufacture, is made into pipes, for which it is well adapted.

To return to the clays of Warren county. I would suggest the possibility of employing those which are coloured, (and which, on this account, are unfit for porcelain,) in the manufacture of pipes and the coarser kinds of pottery, where colour is not a matter of much consequence. They would form excellent crucibles and pots, and if mixed with the proper proportion of feldspar, an excellent glazing or enamel for the ordinary earthen wares. The clays of New-York are mostly calcareous, and hence fusible and ill adapted for any kind of ware which requires a high temperature in baking or burning. These clays, then, are of great importance, and may justly be considered as a great accession to the mineral riches of the State.

Marble.

Marble of different kinds and qualities is abundant in the Second Geological District. Some of the varieties have been noticed in the preceding reports. Many of the localities are favorably located, both as to water power for sawing, and for safe transport to market. The only variety of marble now wrought belongs to the Trenton limestone, or blue limestone as it is called. This is usually dark, varying from a dark gray to a jet black. The dark colours have generally obtained the preference in market for mantel pieces and ornamental work.

One of the most valuable quarries which has been opened is at Glen's Falls. Nature at this place has exposed the strata in such a way that the whole thickness of the limestone can be examined without the labor of artificial or expensive mining. The river has cut into the rock to the depth of at least 70 feet.

The marble is extensively manufactured by two enterprising companies; it is therefore favorably known to the public, and has acquired a high reputation. For this reason it would be superfluous for me to give a particular account of its qualities. I take the liberty, however, to subjoin a letter which I have recently received from the agent of the Glen's-Falls company in relation to the position of the marble in the quarry, and also of the quantity which has been manufactured, &c.

"The Hudson river at Glen's-Falls has worn a passage through the limerock to a vast depth, rising in some places seventy feet from its surface. The strata measure from one inch to ten feet. A short distance from the river, on the Saratoga side, lying on limestone, is found black slate. Succeeding this are found strata of marble; slabs have been sawed and used for fire-places. It is sound, and of good colour. Succeeding this on both sides of the river, are found 50 strata of limestone, composed

in part of organic remains. Next in succession are found strata of gray marble, two and a half feet thick; it receives a fine polish, but the colour is not admired. A stratum of darker colour follows this which is six inches thick, though valuable only for stepstones. Then follows the black marble, which for brilliancy of polish and beauty of colour, perhaps, has no rival. The whole stratum is ten and a half feet thick. Veins of organic remains run at irregular distances from each other through the strata; these veins are from two to four inches thick, running ten and sometimes twenty feet, break off abruptly. Where these veins do occur, though they are not numerous, they rather mar the beauty of the marble. Who first discovered this marble is not known, and it is of little consequence to inquire. Numerous attempts were made to work it, but without profit, until the present company received it.

"The following exhibits the amount of stone which the Glen's-Falls Company have prepared and sent to market during the last four years. The company run 16 gang of saws, which are equal to about one hundred and sixty single saws.

In 1835,.....	2,157 feet, or	32,000 pounds.
1836,.....	19,800	" 278,500 "
1837,.....	23,400	" 333,900 "
1838,.....	25,000	" 352,500 "

"It is remarked farther by Mr. Roberts, the agent of this company, that the Glen's-Falls marble has gained a good reputation with most of the workers of marble in New-York, Boston and Philadelphia, as it regards its colour, the polish which it receives, and the ease with which it works; and that it is considered equal to any of the kind in this country.

"He states that they have got out shelves for mantels seven feet and six inches long, thirteen inches wide and one and a quarter thick, which sells for sixty-five cents per foot. The price for this kind of stuff has fallen, and at the present is worth from fifty to fifty-five cents per foot; that which is shorter, from thirty to forty."

There are some considerations in relation to the marble business, which are necessary to be understood by those who are disposed to engage in it.

1. The expense of opening the quarry.

2. The soundness of the layers which it is proposed to work.
3. Their freedom from hard or flinty particles or masses, as quartz, hornstone, &c.
4. Sufficient thickness in the several layers composing the bed; for unless there are a number of layers of sufficient thickness to work in juxtaposition, it will be necessary to remove a great mass of useless material. Small defects, such as checks, seams or cracks, or imbedded masses of flint, reduce the value of any piece materially. It is necessary therefore that there should be a general freedom from all the above defects, in order to make it a profitable business.

A variety of marble quite distinct from the preceding, occurs among the primary rocks, principally in the gneiss districts. It is that variety which is known among the mineralogists of this country as the *verd antique*. It is therefore formed by the intermixture of the primitive granular limestone and green serpentine. The limestone varies from white to grayish white, and the serpentine from dark grass green to straw yellow; hence there are many varieties of this kind of marble, even in the same quarry.

The variety of shade depends mostly on the serpentine. This occurs in it in small and larger masses, perfectly distinct, and free from the limestone constituting its ground or base, but at its borders it blends with it, and forms thereby a clouded appearance as the two mingle and combine with each other; there is therefore no sudden transition of colour which is seen in the variety of Italian marble, known in market under the name of Egyptian; the tints and colouring are gradually softened into each other. In polishing, the colours and shades are often brought out in ideal landscapes, which have a very pleasing effect.

The *verd antique* has been discovered since the commencement of the survey; it was entirely unknown in this State previous to my discoveries of it the last season, and which was made known in the second report. Since I have found it extremely abundant, and of an excellent quality. The question concerning its value can only be settled by trial; it is of no value, of course, unless it can find a market, and this depends on the taste of community. Were it not for the fact that we often admire a thing because it is foreign, and has been imported at a great expense, there could be no doubt on this point; but as it is, many years may elapse before its reputation can be established.

It is not improbable but that our verd antique may find a market abroad, and it would be well for those who are personally interested in the subject to prepare samples of it and send them to England. This variety is known to be scarce in Europe, and it might be introduced for tables and other ornamental purposes at once, if there should be a judicious selection of the varieties.

In polishing it, it is necessary to observe more care in giving the final finish. The serpentine being softer than the limestone, wears away more rapidly, and if regard is not given to this part, the former wears below the surface of the latter, and may not therefore be brought into so direct a contact with the polishing agents; it may be left with less lustre, though it is as susceptible of receiving a high polish as the limestone.

This variety of marble occurs abundantly in Moriah, Warrensburgh, Athol and Johnsburgh. It is an unstratified rock, but breaks readily into oblong masses of a shape suitable for working in the ordinary mills for sawing stone. Its occurrence is similar to the primitive limestones which were described in my last year's report.

In selecting quarries of this material, it will be necessary to reject those which contain masses of the silicious minerals, as quartz, augite, scapolite and hornblende. Experience will, it is believed, establish the opinion I entertain, and which I have often expressed, that those masses do not extend into the interior of the rock, but are confined mostly to its surface.

This rock is always more or less weathered upon the surface; hence it presents a rough, ragged aspect, which arises from the disintegration of the limestone, leaving the serpentine in relief. This effect is produced by long exposure, and is no objection at all to the rock, as might at the first view indicate. All rocks are weathered more or less, even the hardest, or those composed of silex. The limestone, when pure, in weathering undergoes the change uniformly, and therefore leaves an even surface; whereas the verd antique is composed of two materials, one of which is acted upon more than the other; hence the latter is left in irregular shaped masses on the surface. This fact entirely conceals the character of the rock, and an ordinary observer would not suspect to find in it a marble, or a rock which could receive a polish. Another fact of importance in regard to this stone, is that it is very strong and sound, and appears, though no experiments have been made in regard to it, equally strong in every direction. Its soundness appears at once when struck with a hammer, in ringing sharply like good earthen ware.

It also appears when we attempt to break it, exhibiting a toughness which approaches to that of hornblende.

This property is evidently one of importance; it is more useful for mantel pieces, or in any work where pressure is concerned, less danger in transporting to market, and less risk both to the seller and buyer. It will be found more durable than many of the white marbles, as it is never arenaceous or pulverulent.

Peat.

From the abundance of peat in this State, it appears that the climate and other circumstances are favorable to its production. It is not so hot as to cause a rapid decomposition of vegetable matter, nor so cold as to prevent those changes, somewhat allied to fermentation, which are required for its formation.

Mr. Mather, in his report for last year, gave extensive details of the quantity and value of this substance in the southern counties. It appears from the above report, that the quantity is quite sufficient for its demands at present: when we take, however, into consideration its great value to the agricultural, manufacturing and commercial interests, and the probability that the demands for it will greatly increase as its worth becomes more extensively known, there is no reason to fear that the supplies will be greater than the demand.

I remarked in my report for last year, that little or no peat had been discovered in the counties of St. Lawrence and Essex. I feared, therefore, that this valuable substance would not be added to the list of the useful productions of the northern section of the State. Contrary to expectations, I have discovered it in many localities, and find it in great abundance in the counties of Clinton, Warren and Hamilton; and I may state in general, that most of the fly's in those counties abound in this substance.

It will not be necessary nor useful to give a particular account of all the localities of peat which have fallen under my observation during the past season. The only places where it can occur are those of a marshy character, and the substance itself may be tested by any person, by first drying and then igniting it; if it burns, it is peat. As its presence may be suspected in all low, wet places, especially those bordering on ponds and lakes, it will be well to search for it in all such places, by thrusting down a pole or stick and trying the matter that adheres to it, as it regards its combustibility; or it may generally be found wherever

the surface of the ground is easily agitated by passing over it. One of the largest collections of this substance which has fallen under my observation is in Champlain in the county of Clinton. The peat marsh, or fly, to which I refer, is in the west part of the town, and is about two or two and a half miles in length, and from a half to three-fourths of a mile wide. Over the whole extent of this fly a pole may be thrust down from 12 to 30 feet, and probably in many places to twice 30 feet. It is of course nearly inexhaustible. Others, of nearly equal extent, occur in the county, and many which are less extensive. One fact, which applies to all the peat marshes of this neighborhood is, that they are situated far above the present level of the lake, and that those marshes which are on, or near the same level as the lake, do not contain peat, and those are quite numerous. This statement, if it should be found true, without exception, seems to indicate that the lower marshes have not been reclaimed from the deep long enough for this substance to form, and it goes to support the opinion I have elsewhere advanced, that this region has been subject to repeated oscillations since the commencement of the present order of things.

Another important growth of peat is found in Warrensburgh, Warren county, on the farm of Mr. Richards. In extent it occupies about 60 acres. It is upwards of 60 feet deep, as has been proved by sounding; hence the fly is not so extensive in superficial area as many others. It still contains a vast amount of peat. It is of an excellent quality and easy of access. The value of a marsh of peat may be estimated by determining the worth of a cubic yard, or a load, or any given quantity, and calculating the amount of peat which is contained in the area. The quantity of peat in a square rod of surface, and worked to the depth of 30 feet, would furnish 284 loads, which may be considered as worth 50 cents per load, or if we estimate it at only half this amount we perceive that 50 or 60 acres of it is almost invaluable when favorably situated. Even a small bog in the centre of a farm might be employed to increase its value one-half, as it would furnish an abundance of manure for an indefinite period. Many smaller deposits of this substance I found in the towns of Schroon, Chester, Warrensburgh, Johnsbury, Queensbury, Lake-Pleasant and Wells, varying in extent from one to five acres.

There are four purposes to which peat may be applied:

1st. As a manure. To secure or obtain an important result something more is necessary than simply to spread it upon the soil. It

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should be raised in the fall, spread in the barn yard, or placed in heaps and mixed with animal matter and lime. Placed under these circumstances it is exposed to the frost and the atmospheric agents, which produce in it incipient chemical changes necessary to convert it into the nutriment of plants. This is especially the case when lime is added to it, which forms a soluble salt, the *geate of lime*, with a portion of the vegetable matter. In the spring it is prepared for removal to the field, and may be spread upon the meadow for grass, or it may be used as a manure for corn, potatoes, &c. It will not answer a good purpose when employed without due preparation, especially when it is spread on meadows for grass; it then becomes dry, is insoluble, and of course unfitted for the nourishment of vegetables. The same remarks might be applied to the preparation of peat as are recommended under the head of preparation of the marly clays.

2d. Peat, as is well known, answers a good purpose for fuel, and undoubtedly ranks next to coal for sustaining for a long time a high temperature. There is no substance which would remove so much suffering among the poor as the general introduction of this substance for fuel in our larger towns and cities. Its abundance and cheapness recommend it to the attention of the public, and if measures could be devised to bring it into use in this State, many important results would follow.

3d. Peat furnishes an abundance of carburetted hydrogen, and hence may be employed for producing gas light. Dr. Lewis Feuchtwanger, of New-York, has made known to the American public the experiments of Merle, a director of a gas light company in France. The advantages of peat for the production of gas are as follows: 1st. It is less expensive than gas from coal, oil or resin. 2d. The produce is nearly as much as from those substances. 3d. The gas is quite harmless and inoffensive, and has, in respect to healthfulness, great advantages over some of the other kinds of gas.

4th. After it has been employed for gas it may be used for fuel, and it is equal to any charcoal.

According to Merle, one thousand kilogrammes of peat, when distilled like coal for two hours, yields eight thousand cubic feet of gas, which has rather a weak illuminating power, and contains much carbon, and which, though purified by water, loses a great deal more of its strength; but if the same is distilled for three-fourths of an hour, only five thou-

sand five hundred cubic feet of a pure gas are obtained, but which affords a stronger and whiter light than coal or oil gas.

An apparatus, consisting of a condenser with eighteen tubes, is fixed for purifying the gas, each tube stands in a reservoir of flowing water, so that the gas has to pass eighteen times through the water; during its transmission it is not deprived of its carbon; in addition to this, it has to pass through two layers of dry lime; the gas thus purified retains no offensive odour, and may be respired when mixed with atmospheric air without inconvenience.

I have copied the whole paragraph from the Journal of Science, with some slight alterations, in order to bring a subject so important once more before the public.

If the above details may be relied upon, and if the experiments of Merle are satisfactory, if peat can be employed to advantage in the production of gas, it becomes one of the most important natural productions in the State, second only to coal for fuel, and equal to it for producing a beautiful and agreeable light. It would at once become a source of individual wealth, and furnish employment for a multitude of laborers, and increase the amount of transportation from the interior of the State to the cities and larger villages. It would employ a vast amount of material lying useless and unproductive, and one, too, embraced in our own territory. It would be using a great capital which has been accumulating for a long time, and has been reserved in store for this age of enterprise.

Perhaps it would be saying too much to assert that peat is more valuable than coal, but when we consider that for creating heat it is not very inferior to bituminous coal, that it contains a gaseous matter equal in illuminating power to oil or coal gas, that its production is equally cheap, and in addition to this that it is a valuable manure if properly prepared, its real and intrinsic worth cannot fall far short of the poorer kinds of coal. There is one consideration which commends itself to the philanthropic of all our large cities, viz. the introduction of peat as a fuel to supply the necessities of the poor. It is believed that much suffering may be prevented, and much comfort promoted, by the use of peat in all places where fuel is expensive, as in New-York and Albany. A careful examination, therefore, of places favorable to the production of this substance, is a matter of some considerable importance, as it is the next best substitute for the more expensive article, coal, and any thing for fuel which will save a farther destruction of the forests, both in New-York and the New-England States, is worthy of adoption from

more considerations than one. A due proportion of wood-land to that under tillage, adds greatly to the beauty of any district of country; but above all, the preservation of timber lands is becoming a matter of great moment, and calls for legislative aid and encouragement.

Again, since the above was written, I have been informed by an intelligent gentleman, that peat, as a fuel for steam engines, has been proved by actual experiment of great value. To impart to it the power of emitting during combustion a lively flame, a small quantity of tar is mixed with it, which of course creates a larger volume of flame, which is a matter of considerable moment when employed in generating steam. The experiments referred to were made on board of the Great Western during her last passage, and such was the result that a large amount of peat was taken on board for her homeward passage. The introduction of pressing machines, both for the expulsion of water and diminishing the bulk by compression, will be important to all who engage in raising peat.

I see no reason for extending my remarks on the value of this substance. I shall, therefore, state only one more application of this material, viz. as a substitute for charcoal in the reduction of iron. The coal which is formed from it is equal to any coal; hence, it may become of great importance in those sections of country where fuel is scarce, or as it furnishes a resource in this important business, when the ordinary means are expended. We have, therefore, in this homely substance an invaluable article, of which prejudice alone can prevent a general use.

Black Lead. Graphite.

There are several places where this useful substance is found. The most important are situated in Ticonderoga, Crown-Point, East Moriah and Johnsburgh. The graphite of Ticonderoga is well known in market, and has been explored to a greater extent than any other locality in the State. The proprietor of the mine has usually raised it in the autumn in sufficient quantities to meet the demands for it during the next season. The working of the mine is in the rudest manner. As the mineral is in a vein varying in width from 2 or 3 inches to 12 or 15, it was necessary after the surface portion was removed to break away the adjacent rock. This has hitherto been accomplished by heating the sides of the vein and then suddenly cooling them; in this way exfoliation and cracks are produced, and an opportunity furnished to a limited extent of removing portions of the rock adjacent to the graphite.

In this manner the vein has been explored 10 or 15 rods in length, to the depth of twelve feet, in some places. By this mode of procedure the opening downwards has become wedge form, so that it is now difficult to pursue it much farther in that direction. The best part of the lead of this mine is manufactured into pencil points on the spot.

The graphite of Cedar-Point, in East Moriah, has not been explored very extensively, its character was destroyed soon after the mine was opened, in consequence of mixing the oxide of iron with it, to facilitate its passage through the mill in grinding, a mixture which entirely destroys its value for any purpose to which it is ever employed, even for the blacking of stoves.

The locality in Johnsburgh is on the farm of Mr. Noble. The mine is only partially opened, and less than a ton has been raised. It is, however, of a good quality; it occurs in irregular shaped masses of various sizes, and weighing from one to twenty-five pounds. It is associated in a vein of quartz. It occurs in stellate masses similar to that at Ticonderoga. In the vicinity I found perfect hexahedral tables of graphite, which exhibit lines on their broader planes crossing each other at oblique angles, indicating by their direction the system of crystallization to which they belong.

This mineral has occurred in independent masses in the rock and even in the soil. A locality of this kind was discovered in Athol, which contained several tons, the whole of which has been sent to market. Those deposits appear disconnected with a regular vein, and hence they ought always to be carefully examined by persons intending to purchase them for the profit of mining.

Preparation of the Marly and Tertiary Clays.

In agriculture, as in all other kinds of business, many things fall into discredit in consequence of misunderstanding the principle on which their use depends. For instance, the use of plaster on most soils is decidedly beneficial, but there is such a thing as an excessive use of it, and of persevering in its use too long, when its specific effects are imperceptible, and it becomes of no value whatever.

The due preparation of soil is always an essential matter for the production of a good crop, or to produce a favorable result either in an experimental trial of any new variety of grain, or new mode of culture of those ordinarily raised. It is a matter of common observation, that one farmer succeeds well in his crops, while another does not, though

his natural circumstances are equally favorable. Remarks of a similar nature may be made in relation to manures. One succeeds admirably in the use of marl, while another after a little trial, wholly discards it as useless, if not hurtful. This difference of opinion and practice, which is often the result of experiment, is owing to several obvious causes, such as the different modes adopted for securing the end proposed, and which arises from an imperfect or vague notion of the principles by which the desired result is to be produced.

In the use of the clays, as the common, marly and tertiary, I have found a variety of opinions, each of which, it is pretended, are based on experience. One considers them hurtful, another as useless, while a third finds them, on trial, very useful. It is important to understand how such a diversity of opinions exists, when they are founded on experience.

I conceive that there are two reasons for this. In the first place, the original character of the soil is such that the use of the clays, under no circumstances, would be proper, or followed with beneficial results. Clay already forms an abundant element in the soil, both for the aliment of the plant, and for the firmness of the soil. In the second place, it is not used in the right state or with due preparation. This leads me to the direct question, What is the right mode of using the clays, or what preparation do they require?

1st. The great point to be attended to, is to secure a sufficient degree of fineness, that they may be incorporated with the soil, and form, strictly speaking, a constituent part of it. To attain this object, it is necessary that they should be raised in the autumn and placed in heaps, that they may be exposed to frost and the atmosphere through the winter. To assist still further in the process of pulverization, it is better to mix them with barn-yard materials, straw, manure, and refuse of any kind, either animal or vegetable. This course being pursued with them, they should be spread as evenly as possible on green sward, that they may enjoy the further benefits of air, moisture, &c. by direct exposure during the season. Besides, the grass in passing up through the layer will assist greatly in producing a comminuted state. The succeeding season, it is in a state to be ploughed in, when it is duly prepared to become a constituent part of the soil; it is only in this way that the stiff and adhesive clays can be broken up and prepared for an incorporation with the other earths.

Suppose a different course was pursued. Instead of raising the clays in the fall, it was raised and spread immediately in the spring, and ploughed into the soil; the result would be, that it would remain in masses in the earth, and unmixed, in which state it will continue for years with but little change, and instead of being a benefit, it would rather form an annoyance, and incommode both the farmer and his crops. From these remarks, it is clear how two farmers might disagree in their experience with the clays. One, by a suitable preparation of the material, finds a great advantage in their employment; another, by throwing them on or into his soil in lumps, perceives no effect on his crops, or is incommoded by the hard baked masses of clay which a hoe can scarcely divide asunder. It is true, that in time, those masses would disappear, and finally they would become incorporated with the soil, but several seasons would elapse before this would take place, and the result of the trial would be such as to discourage the further employment of the article; besides, I believe that clay or any other material is more readily broken down and pulverized when first taken from the bed than afterwards, when it has been exposed to the hardening influence of the sun during the warm season.

The necessity of an intimate mixture of any substance intended to act as a manure, cannot be too much inculcated by the agriculturist.

Most of the clays of this State are those which are marly, or which are combinations of clay and carbonate of lime. They are widely diffused, but their value is not highly appreciated. The time is not distant, however, when they will be esteemed as highly as plaster. They have even one advantage over plaster, that their effects are more lasting when they have had a due preparation.

The practice of employing vegetable or animal substances in conjunction with marl, or the varieties of calcareous manure, has not prevailed to a suitable extent. It must be plain that carbonate of lime, or sulphate of lime, cannot support vegetation without other materials. It appears, however, that a large proportion of the food of plants exists in the earth in an insoluble state; and that it is by a chemical union of the calcareous matter and this insoluble vegetable substance that it becomes soluble, and fitted for the sustenance of plants in general; hence arises the mutual benefit of combining earths with vegetable and animal substances; and hence, too, the bad practice of continuing the mineral manures until the whole of the vegetable and animal matter is withdrawn from the soil; for by the increased activity of the growing vegetable, the soil

is rapidly exhausted of its nutritious matter, and it is left comparatively barren, if the agriculturist ceases to apply vegetable and animal matter. There remains then but one course, that of supplying directly the necessary nutriment; but it is unquestionably better to maintain a sufficiency of vegetable matter always in the earth, and never suffer a soil to be exhausted or worn out by overtaxing its resources.

HAMILTON COUNTY.

Without entering into details in relation to the geology of Hamilton county, I shall confine my remarks to subjects of a general nature, reserving the more minute relation of its local formations to the future.

This county is underlaid by primitive rocks, with the exception of a narrow strip of the Trenton limestone extending along the Sacanadaga, in the town of Wells. This strip is less than one-fourth of a mile wide, but may be traced with some interruptions for two or three miles. It is a thin stratum, and much broken by partial uplifts. It is filled with organic remains common to the Trenton limestone. It is quite an important rock to the inhabitants, furnishing a cheap and convenient material for lime, and sufficient in quantity for supplying the demands for building, and for agricultural purposes.

The primitive rocks are gneiss, hornblende, primitive limestone and serpentine. These are arranged as in other portions of the district. Gneiss and hornblende are the predominant rocks, while the limestone and serpentine occur in irregular beds, or veins, apparently subordinate to the former. I am led to remark in general, that we find no new arrangements of mineral matter, or new phenomena as regards position; but a continuance or extension of the same as they occur in other portions of the district, thus showing an uniformity in the operation of the laws of nature.

Hamilton county is as yet a wilderness, and consequently we labor under great disadvantages in attempting to explore its mineral riches; should it equal, or even exceed, the other counties of the district in this respect, a full development of them cannot be expected at present.

Contrary to the published accounts, and to common opinions, which are of course formed principally from those accounts, especially from Burr's and Gordon's statistics of this county, I have the pleasure of stating that it is far from being that *wet, cold, swampy* and *barren* district which it has been represented to be. The soil is generally strong and productive; the mountains are not so elevated and steep but that

the soil is preserved of sufficient thickness to their tops to secure their cultivation, and most of the marshy lands may be reclaimed by ditching; by this means they will become more valuable than the uplands for producing hay. In fine, it will be found an excellent country for grazing, raising stock, and for producing butter and cheese. The strength of the soil is sufficiently tested by the heavy growth of timber, which is principally of hardwood, as beech, maple, yellow birch, butternut and elm. The evergreens, or pines, are confined mostly to the lower ranges of mountains. Some of them are of the largest growth of any in the State, and are suitable for the main shafts of the largest of the cotton mills. In the main the county resembles the mountainous districts of New-England, and like those, produces the same intermixture of forest trees, and has about the same adaptations for the production of the different kinds of grain, as wheat, rye, oats, peas and barley, together with fine crops of potatoes.

The face of the country varies from hilly to mountainous. A low range of mountains cross the county between the town of Wells and Lake Pleasant; the whole width is not far from six miles. This range, in its progress northeastwardly, increases in elevation until it constitutes the highest of the mountain groups in the State, in the towns of Moriah and Keene.

From six to ten miles westwardly from Lake Pleasant, another low range of hills and mountains cross the county parallel to the former, but do not attain an equal elevation. The highest summit of this range is in township No. 19. From these remarks, and from an inspection of the maps, it will be perceived that Hamilton county is situated west and southwest of the mountainous track in which the most elevated groups occur. Its location in general is more favorable than Essex county, in which those ranges attain their highest elevation.

From the observation of persons who have been residents of the county for a number of years, it appears that the seasons are much the same as it regards heat and cold, the length of the summer, &c. as the mountainous parts of New-England. The incorrect opinions which prevail as it regards its soil and its irreclaimable marshes have arisen undoubtedly from hasty examinations. It is true, that the fens or marshes are numerous, but they are not so wet as to be unproductive, or so sunken as to form nuisances. Where the timber is removed, they produce spontaneously a heavy crop of grass, which is reproduced from year to year without cultivation. Again, the fens are bottomed on a hard clean gra

vel and sand which occurs at the depth of from 1 foot to 10; but when the depth is greater, it is not an unfavorable circumstance, for in almost every instance of the kind, I found the superior stratum to consist of peat.

So far then as it regards marshes, wet and cold lands, and irreclaimable bogs, they are rare, and most of the marsh land forms the most valuable and productive portions of the county; producing, as I have already remarked, a valuable grass, called the *blue joint*, and which makes a nourishing food for cattle without the labor of tillage, or supplies it until such times as the better grasses can be raised by the ordinary labors and prosperity of the husbandman.

Again, it is probable that when the county is settled extensively, and the timber and wood removed, there will be an amelioration of climate; it will then become drier and less frosty, and the summer warmer and better suited to the raising of corn. The condensation of moisture over an extent of surface equal to this uncultivated tract in this section, must have a great influence in reducing the temperature to a low standard. The density of the forests, the thick growth of underwood, effectually excludes the rays of the sun during the entire summer. For this cause the temperature of a wooded district is considerably lower than an open country under tillage.

The most interesting physical features in this county arise from the number and beauty of the lakes which are sprinkled liberally and picturesquely over its surface.

Much has been said of the clearness of the waters of Lake George, and not without reason; if however, the traveller will extend his wanderings to Lake Pleasant, Round, Piseco, and Racket lakes, he will find them its equals, if not its rivals. The clearness of the waters in all these lakes is owing to the primitive character of the region in which they occur. The lakes of Hamilton form a beautiful addition to the scenery of our country. Although the mountains are not so high as those of Scotland, still, it will be a matter which will occasion no surprise, (when Americans shall have acquired sufficient independence to admire a thing that is American,) if these lakes do not become objects of admiration, and shall be considered as vieing with those of Scotland. Settlements are now forming on the margin of those beautiful sheets of water, and were buildings erected suitable for the accommodation of travellers in some central place among these lakes, (which we doubt not will be the case in a short time,) our pleasure seeking community,

of whatever cast, could spend a few days or weeks, with as much zest as is afforded by any of the places of public resort which are so thronged during the heat of the summer. As I have already intimated, the axe has been laid at the root of the tree, and ere long where naught now greets the eye, but a dense, and to appearance impassable forest, will be seen the golden grain, waving with the gentle breeze, the sleek cattle browsing on the rich pastures, and the farmer with well stored granaries enjoying the domestic hearth.

A subject which involves more deeply the interests of this section of country, may with propriety, be introduced in this place, viz: the means of forming easy communications with different portions of this and the neighboring counties. To enter fully into this subject, would require a collection of facts foreign to the objects of the survey; but the few I am in possession of may lead to a more careful examination of the subject, and finally result in something highly beneficial to this section of the State. From actual observation it is proved that the lakes above mentioned, vary but little in their relative levels, and that those which are connected by streams flowing from one into the other have but little fall, and in fact the larger are not rapid, and are at present navigable for small boats. Such being the case the large sheets of water may be connected with little labor and at a trifling expense. The distance between Piseco and Round lake is six or seven miles, and in this distance the fall is not more than 20 or 25 feet. Round lake is already connected with Lake Pleasant by a natural canal; the water is discharged from Lake Pleasant in a still stream, which is now boatable three or four miles; thus by the connection of these waters the expense of which could not be great, there would be a water communication for twenty-three or twenty-four miles. Again, there is a fall of about 15 feet between Round lake and Jessup's river, which is a stream of sufficient magnitude to sustain boats of several tons burthen. This river runs north twenty-five miles; has no falls, and is not a rapid stream; flowing north about ten miles it approaches Lewis' lake, the outlet of which is a sluggish stream, which in the distance of three or four miles falls into this river. The distance between Lewis and Indian lakes is twelve miles, and the whole distance is boatable. These waters therefore, which flow north, may be connected with Round lake at a comparative trifling expense, and thus open a boat navigation in that direction twenty or twenty-five miles. The Indian river, which is an outlet of Indian lake, and receives also the waters of Jessup river and Lewis lake, soon turns its course eastwardly, and empties into the north branch of the north river. Leaving therefore the Indian lake and river, and pro-

ceeding in a northwest direction, we soon reach the head waters of Racket lake. It is said that in passing over a very slight elevation or ridge, we come upon a small lake, and following its outlet we may pursue an almost uninterrupted course into Racket lake, and thence into Long lake. It is over this carrying place, between Indian lake and the first lake in the series towards Racket lake, that the Indians are in the habit of travelling, and over which they carry their canoes. The whole carrying distance from Indian to Long lake is six and three-fourths of a mile. The whole course of the route which I have now traced, is one which is feasible for the construction of a canal, and one too which would require but little capital, as there are no high summits to cross, nor heavy falls to encounter, or which would demand a great amount of lockage. But the internal navigation need not end here, for the waters of Racket lake may be connected with those of Moose river, for with scarcely a carrying place, the hunters and fishermen take their boats from the Racket lake into the head waters of Black river. And again, I was informed by a gentleman of Lake Pleasant, that during a visit to Racket lake, a few months previous, he met with two fishermen who came seventy miles in their boats and brought several barrels of salt; and they came the whole distance in their boats from the waters of the Saranac, for the purpose of fishing in Racket lake, from which they carried away seven barrels of lake trout on their return over the same route.

The practicability of uniting the head waters of those streams which flow into the Hudson, Lake Champlain and St. Lawrence, is not doubted by those who have carefully observed the features of the country.

It may be inquired what advantages would result, which could justify an expenditure of capital in a region considered of little value for agricultural purposes.

1st. I will say, that it is not, as has been already intimated, that bleak, barren, desolate tract, which it has been represented to be; but is well adapted to the cultivation of wheat, and suitable for all agricultural purposes, though it is more especially adapted to grazing, and the making of butter and cheese.

2d. This region abounds in the ores of iron, limestone, marble and the usual products of a primitive region.

3d. It would be the means of bringing into market (of which there begins already to be a scarcity,) a vast amount of lumber, which, without facilities of the kind, must be destroyed or wasted on the ground, without benefitting the public extensively.

4th. Inasmuch as communications of some kind must be formed in inhabited districts, the expense of a water conveyance through this region will not be much greater, *in the end*, than an ordinary turnpike; a canal, therefore, might be used as the great thoroughfare, while the minor points would be connected, as usual, by roads.

The above suggestions will appear more important and in their true light, when taken in connection with the proposed rail-ways from the St. Lawrence to Champlain. In case the southern route should be selected, the whole interior of Hamilton and the adjacent counties, to some extent, would be furnished with an easy and direct outlet to market. It is difficult to make an estimate of the number of miles which would be opened at once for batteaux navigation, and which might be opened at a small expense, but it is not extravagant to estimate the distance as equal in length to the Erie canal. There would be opened, also, at least fifty miles of direct steam-boat navigation, by constructing a single lock between Crotched lake and Long lake, and another between the former and Racket lake. The latter is one of great importance, and is much larger than is represented on the maps. It is deeper and more extensive than Long lake. It has several bays which project from the main lake five or six miles; it is probable, therefore, that the amount of water in Racket is double that in Long lake. I have already remarked that the character of the borders of the lakes and streams is well adapted to the easy construction of paths and roads, in consequence of the predominance of hard gravelly bottoms. There is another consideration not to be overlooked, that the whole country being situated upon table land, is not exposed generally to injury by freshets; hence, public works, as embankments, &c. constructed along the rivers and borders of the lakes, will not be liable to excavations by the rapid rise of water; hence, too, the expense for repairs will not constitute a heavy drawback on the profits of the works contemplated. I am sustained in this position by the preservation of the great State road passing through this country, which, though constructed a long time since, has suffered very little in its foundation.

In conclusion, I remark, that whatever may be the present interests of individuals, or the present policy of the State, this region of country cannot remain long unoccupied or unimproved. It would be well, however, if this policy could be settled soon, for landholders would then feel the importance of employing agents to maintain an oversight of their lands. At present, they are exposed to the wanton destruction of trespassers, who for a single cut of a pine, make no more scruple in

felling the venerable individual of two centuries, than in cutting the sapling of yesterday.

CLINTON COUNTY.

I shall not attempt to give in detail the geology of Clinton county in the present report, or present any thing like a full account of its natural resources. A large and interesting portion of it has not yet received that attention which it deserves or is entitled to, and the remainder has not been examined at all. So imperfect are my own views, and unfinished my labors, that I prefer a delay of one season than to present what must be considered an imperfect view of so important a county.

Whoever has travelled during the summer from Port-Kent to the Canada line, along the main road, cannot have failed to remark the excellence of the soil and the favorable make of the country for agricultural purposes. Probably there is no better soil in the State than that of Peru, Chazy and Champlain. It is composed of a due intermixture of the tertiary clays and sands, which nature has sometimes mingled in the proper proportion to constitute the best for agriculture; in other cases, they are placed in juxta position, prepared to the hand of the husbandman to make that mixture which, in his judgment, shall best promote his interests. Of the richness of the soil, and the favorable nature of the climate, we have an unfailing test, also in the thrifty growth and healthy state of the apple, and other fruit trees. In a cold soil and a windy district they are uniformly stunted and covered with parasites, which gives them really a gloomy aspect; but in a good soil and temperate climate they always look flourishing and green, and free from that sombre appearance they wear when their limbs and twigs are covered by a parasitic growth of lichens.

Such is the case with the fruit trees of this region, and for aught I could discover, they appeared equally flourishing with the southern productions belonging to the same species. In regard to the general fertility of the soil, and the favorable nature of the climate, the general productions of the settled portions of the county furnish ample evidence, and it will not be considered as a disparagement to any other part of the State to say, that the soil is good enough. The general surface of that portion of the county bordering the lake, and extending west ten miles, is rather uneven, though interspersed frequently with level tracts.

The rock formation is a continuation of that of Essex, described in the report of last year. The transition is, however, wider and more perfectly developed.

The general arrangement of the transition rock is as follows:—The sandstone, which is so perfectly exhibited in the great gorge at Keeseville, in its progress north, passes beneath the Trenton limestone, or as it has usually been denominated, the transition limestone. The latter rock from Port-Kent, as it continues north, skirts the lake the whole length of the county, and extends west five or six miles. The sandstone at this distance makes its appearance by emerging from beneath the limestone, and may be traced farther west for the distance of five miles. Beneath this are the primary rocks. We have then a broad belt of the old transition rocks extending north the whole length of the county, and west from Lake Champlain about ten miles. This general statement requires a single modification, viz: that the transition passes around the great primary chain of mountains at the north, and they therefore extend into Franklin county without any interruption; and we may pass into Franklin, or even St. Lawrence county, on the great transition formation, without encountering the primary rocks.

From this statement it will be perceived that the axis of the primary mountains terminates south of the provincial line. The whole range slopes rather abruptly as it continues on the north side of the boundary, but soon disappears entirely, or is lost in the perfect levels of Lower Canada. The termination of the northern highlands of New-York is Covey hill, over which there is a good road running nearly parallel with the provincial line and about two miles north of it. Having attained the summit of this ridge on the Canada side, the traveller may view the whole of that triangular portion of country lying between the St. Lawrence and the Sorel rivers; it is spread before him as on a map. The whole appears, with trifling exceptions, as a vast wooded plain, presenting to the eye an agreeable variegation of water, dark and light shades of forest trees, and skirtings of blue mountains in the distance, in sufficient profusion to produce as fine a landscape as the lover of nature can wish.

The most remarkable phenomena of the transition rocks occur in connexion with the sandstone. They consist in fissures more or less deep, running through the rock in various directions. One of the most remarkable of them occurs at Covey hill, or as it is more usually called on the New-York side, at the *Flat rock*. This fissure, or gulph, is about half a mile in length and sixteen rods wide, and is bounded by perpendicular walls of sandstone. A small stream runs through it and forms in the gulph a small deep lake. The distance from the surface to the water, as measured by Dr. Churchill of Champlain, is 150 feet—the depth of water 150 feet. The direction of fracture is north 70° west.

The rock dips from each side of the fracture at a very small angle.—Flat rock is more or less a conglomerate, and is generally a coarser sandstone than the variety at Potsdam or Keeseville. It occupies an area of several miles, and presents quite a remarkable aspect. It is covered mostly with low shrubs and whortle bushes, with here and there a solitary tree which has monopolized a little more earth than its humble neighbors.

Economical Productions.

Under this head I shall speak of a few only, and those which are of the most value.

Sandstone for glass.—The sandstone which lies along the borders of this formation and near the primary rock is often of a pure white, it possesses a loose granular texture, which is often increased by weathering, it then passes into a sandy variety. In this state or condition the rock furnishes an important material for glass, and is extensively employed in its manufacture. The most important localities which fell under my own observation were in the township of Mooers. The material is abundant and of the best quality.

Black marble.—A valuable quarry of black marble exists in Chazy, near the lake, and nearly opposite Isle La Motte. It is probably a continuation of the same stratum, which is quarried upon the island. The same stratum, I have observed at other localities. It furnishes a jet black surface, and receives a beautiful polish, and is, altogether a fine production.

The same varieties of the transition marbles are more or less abundant on Valcour's island. It is scarcely necessary to add, that this marble district is capable of furnishing lime to any amount, either for masonry or agriculture. There is one difficulty in raising the limestone, which it is important to bear in mind, viz: the small dip of the rock, or its nearly horizontal position; the expense and difficulty is consequently increased.

Iron ores.—After what has been published in the preceding reports it is scarcely necessary to enter upon a detailed account of the ores of Clinton. It will be sufficient to refer to those reports with this remark, that by far the larger proportion of ore beds exist in the south part of the county, in the neighborhood of Clintonville, Keeseville and in the vicinity of the forks of the Au Sable. There are as many as a dozen beds in this region, some of which are known the world over for the excellence of the iron which they furnish.

One great item of expense which the proprietors of those works have to encounter, is that for transportation of the ore, and of the iron and coal. No relief can be offered to meet or diminish this expense, except the construction of a rail-way. This matter becomes more important every day. The general effect on this region would be the concentration of important establishments at central points along the line of the rail-way; an arrangement which accommodates the public, and is more convenient for those who are engaged in them.

Another variety of iron ore occurs on the head waters of the Saranac. It is the bog ore. Its abundance has not been fully ascertained; but the structure of the county, the nature of the rocks, &c. indicate an abundance of it. Its value for mixing with the harder ores, and also for the production of soft malleable iron, is too well known to require any remarks from me. It is a matter of congratulation to the inhabitants of this truly mining district, that the surrounding country is fertile and productive in the most useful vegetables; so much so that the manufacturing classes must be greatly increased before the country will be unable to furnish the materials for the support of the population.

Changes of the Surface, &c.

The most conspicuous changes which have occurred in Clinton county, and which are confined to the surface, are ridges of pebbles, which have been thrown up by the lake in ancient times. The continuity of those ridges has been broken, and it is difficult to trace them continuously many miles. They are similar to the famous ridge which runs parallel to Lake Ontario, and were probably produced by the same causes, and at the same period. Sand and gravel are raised at the present day by the pressure of ice and the action of waves.

The present existence of those barriers indicate very clearly the former extent of the lake. One of those ridges is crossed by the main road near the village, in Beekmantown. Their general direction is north and south, or nearly parallel with the lake. Theoretical considerations connected with this subject are among the most important in geology. It is not my purpose, however, to present any remarks of this kind at the present time; the subject was partially discussed in my report for last year, under the head of tertiary formations of Essex county.

Remotely connected with phenomena of this nature, is the transportation of rocks, gravel and sand, diluvial scratches, &c. One remarkable instance of transportation fell under my notice on ascending Raven's hill, near Elizabethtown, in the occurrence of boulders of

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sandstone near its summit. They were full 2,000 feet above Lake Champlain. They are not numerous, but sufficiently abundant and large to prove unquestionably their transportation by other means than human.

Scratches and diluvial grooves are every where to be seen on the rocks through this whole section of country. Their general course is north and south. The cause of phenomena of this kind seems to be uniformly referred by geologists to currents which in former times have swept over those sections of country where they occur, or to the passage of icebergs loaded with stones and rocks, when it was beneath an ocean. Not only are the flat or horizontal surfaces marked and grooved, but also those which are perpendicular or at right angles to the horizon. Remarkable instances of this latter occur between West-Port and Port-Henry, in Essex county.

WARREN COUNTY.

Warren county is strictly a mountainous district. It is traversed on the southeast corner by the Palmertown range of mountains, and through its eastern portion by the Kayaderosseras range, quite its whole length. Its western side is occupied by the Sacondaga mountains, which are extremely rugged and precipitous. The highest and most remarkable mountain in the county is Crane's mountain, in Johnsburgh. It is upwards of 3,000 feet above the plains of Warrensburgh. Its superior outline is quite remarkable, exhibiting from whatever point it is viewed, a striking resemblance to the human face. This resemblance arises from the remarkable uplifts of the rock of which it is composed. The prospect from the higher class of mountains in Warren county is quite imposing, as from their summits the great ranges of mountains traversing the northern portion of the State, together with the Green mountains of Vermont, are distinctly in view. Crane's mountain, in Johnsburgh, and Harrington's hill, in Warrensburgh, by their position and height, command an extensive field for observation, and are very advantageously located for conducting a trigonometrical survey. The great group of the Adirondacks are very distinctly seen during clear weather from Harrington's hill, almost due north from the observer, together with the remarkable ragged ridge lying to the east, and which passes through township 29, and onward through the eastern border of Keene. The lover of mountain scenery will not fail of visiting Harrington's hill, when in its neighborhood; it is easy to ascend, and in fact a carriage might be driven to its summit.

The geology of Warren county is quite simple. By far the largest portion is gneiss. A part of Queensbury is underlayed by the Trenton limestone. It is found, also, at Caldwell and Bolton, skirting for a few rods in width the border of Lake George. The character and value of this rock has already been spoken of under the head of marble.

Gneiss and hornblende are the predominant rocks; subordinate to them are beds and veins of serpentine, primitive limestone, and a mixture of the two constituting the peculiar marble which has already been noticed. The Kayaderosseras range is composed of gneiss very distinctly characterized. Veins of coarse granite frequently traverse it, and which sometimes spread out into beds of irregular width. It never occurs in masses sufficiently heavy to impart a granitic character to any portion of the county.

The soil of Warren county is sufficiently productive to answer all the ends of the husbandman. It is mostly diluvial, and is made of gravel and loam combined in such proportions as to form a strong soil well adapted to grass and English grain.

The predominance of the diluvial beds gives an interesting character to the whole county. The extent and depth of those beds, together with their frequent occurrence in rounded and conical hills, or their extension in prolonged narrow ridges for miles in extent, give evidence of former agencies which cannot be mistaken. I may here remark, that the lower valleys and those adjacent to the primary rocks, or lying between the transition and primary, present those accumulations of gravel and boulders* into conical hills and waving ridges, far more distinctly than any other sections of the country. In fact, though it would not be proper to say that the primary is bordered by diluvial hills, still this constant occurrence along certain lines, and those mostly which lie along the base of the primitive hills, will arrest the attention of the observer. The particular constituents of those gravel hills merit attention. I found them composed generally of particles of the adjacent rocks. Thus, through the township of Lewis, in Essex county, those hills are made up mostly of particles of the hypersthene rocks, and at least two-thirds of all those accumulations of gravel in the whole northern section are composed of the same materials. Hence they have not been brought from a distant region, but have been furnished in the im-

* A remarkable boulder exists in Warrensburgh, near the bridge. It is about 30 feet in height and 80 feet in circumference. It is entirely above the ordinary diluvial of the country. It forms a very remarkable monument of the powerful agencies which were in operation in ancient times.

mediate vicinity of the place where they are now deposited. The tertiary in this county is quite limited, and is confined to the borders of Lake George and the North river. It is the most extensive in Queensbury, and constitutes a valuable section of country; the soil is light and sandy; it is still susceptible of the highest cultivation, and may be made to produce abundant crops.

Primitive Limestone.

Warren county is apparently traversed by a ridge of limestone. Its course is nearly east and west. Its continuity is often broken or interrupted by other rocks. We cannot, therefore, trace it continuously. Still its occurrence in this direction at intervals furnishes proof of the direction in which it has been more generally produced. In this respect those veins or beds are analagous to the greenstone dykes, which are so prevalent in the hypersthene rock. The limestone is generally coarse, and mixed more or less with coccolite and hornblende. Its purity, however, is such that it forms a useful material for lime. I have found it in sufficient abundance in all the towns of the county to meet the wants of the community. It is unnecessary to describe or point out the numerous localities at which it occurs.

A remarkable fact connected with this formation may with propriety be mentioned: it is the occurrence of caves in it in Athol, and, as I have learnt, also in Minerva, in Essex county. Those caves are situated on the North river, about two miles from Warrensburgh. They are from 100 to 150 feet above the river, and as would be conjectured, are evidently produced by water. Their entire extent has never been ascertained. Persons have explored them for upwards of a hundred feet.

The period at which those caves were formed was anterior to the accumulations of the gravel already noticed. This statement is supported by the fact that the openings or mouths are covered by this kind of gravel, and they have generally been discovered in consequence of the falling in of cattle while passing over them. In some instances boulders of rocks foreign to the region are wedged into those openings, and partially close them. They have no other interest than the evidence they furnish of the period when they were produced, and of the agent which was the immediate cause of their production. They contain no remains of organic beings, so far as discoveries have yet been made.

Magnetic Oxide of Iron.

Some important localities of iron ore have been discovered in this county. One in particular on lot No. 80, in Hyde Township. Por-

tions of the ore are mixed with sulphuret of iron, which without roasting and exposure to the atmosphere, would form that variety of iron which is denominated cold short. Much of the bed is free from sulphur, and will undoubtedly form an excellent iron. Beds of iron of this species occur also in the Brant Lake tract. It presents a promising appearance, and is located in a region of wood and water, circumstances quite favorable for its reduction.

Other beds exist in Athol and Luzerne; they furnish a pure oxide, and would, if a demand existed for them, make an excellent iron. The beds of this variety of ore are generally less extensive in the gneiss than those belonging to the hypersthene rock. The latter in the northern region seems to constitute the true ferriferous formation in which the development of this ore is on the largest scale.

Another locality of magnetic iron is found in township No. 16, in the county of Essex. The quality of this bed also appears favorable to the production of good iron. It is an extensive deposit, but cannot become important until some better means of transportation shall be furnished than exists at the present time.

Marl.

An extensive deposit of marl exists in Queensbury. It is on lands owned by Mr. Jenkins, an intelligent farmer, who well knows its worth. It is procured in several marshes in that vicinity, and is generally associated with peat. It is a valuable substance, and well adapted to the soil of that region.

Generally marl is not a product of the northern counties, and there are only a few localities at which it occurs. Ground limestone may be employed as its substitute, though its use is attended with a trifling more expense than marl. Marl, however, is more valuable in itself than limestone, as it generally contains vegetable and animal matter in combination, and its immediate effects are more apparent; it is in a state of minute subdivision, and is duly prepared to become a constituent of the soil.

Having spoken at some length of several substances which occur generally in the northern counties, it will not be expected that those subjects will be resumed again in this connection. Those substances are porcelain clay, feldspar and peat. They are each of them abundant products of this county, but for particulars concerning them I refer the reader to those heads under which they are described.

Direction of Dykes, Veins, &c.

From a careful examination of the course and bearing of dykes, I have been disposed to adopt the opinion that they were produced by a cause acting uniformly, and in certain directions during a given period. The grounds on which an opinion of this kind is supported, may be gathered from the following facts: Dykes occur throughout the whole northern region, but there are a few localities at which they are numerous, and may be compared readily with each other. Of localities of this kind I will select Trembleau point in Essex county. In the immediate vicinity of this point, and within the distance of a mile, I discovered sixteen dykes. They vary in width from 2 or 3 inches to 10 feet. The average bearing is north 60° east. There are instances in which the bearing is north 80° east, and others in which it is north 40° east. Their direction is never in the line of the bearing of the strata or mountains, and wherever they belong to the primary rocks, I have never found their bearing due east and west. Though their bearing is not precisely directed to a given quarter of the horizon, still, there is a great degree of regularity within certain limits. Hence the inference, that they may have produced by some cause, acting in a given direction during a single period. A few cases of single dykes may be referred to; for instance, one two miles south from the line of Willsborough, its bearing is north 70° east; another in Warrensburgh, north 45° east; another at the foot of the mountainous ridge between Glen's falls and Jessup's landing, north 70° east; another in Johnsburgh, near Mr. Rosevelt's, north 55° east. That portion of the dyke in contact with the adjacent rock is converted into obsidian. The few facts I have now given, though not sufficient to establish a general law, are still sufficiently remarkable to merit the attention of geologists in other sections of the country.

List of Simple Minerals in the Counties of Essex and Warren.

Limonite, eupyrcroite, magnetic oxide of iron, red oxide of titanium, brown tourmaline, schorl, zircon, yenite, chiltonite, obsidian, adularia, porcelain clay, hypersthene, labradorite, chalcedony, hornblende, asbestos, serpentine, calcareous spar, apatite, pyroxene in all its varieties, garnet, colophonite, spinelle, sphene, graphite, sulphuret of copper, sulphuret of iron, black oxide of manganese, silicate of manganese, lignite, steatite, talc, mica, crystallized quartz, scapolite, tabular spar, sulphate of magnesia.

Temperature of Springs and Wells.

Spring at Johnsburgh, issuing from limestone and under cover, $44^{\circ} 5'$; temperature of air 81° . July 22, 1838.

Of two deep covered wells in Champlain, Clinton county, 44° & 48° ; temperature of air 76° .

Of a deep well at the outlet of Schroon lake, 46° .

At Warrensburgh, 45° ; air 74° . July 14.

A spring at Crown Point landing, 46° ; air 56° . May 23.

Spring at East Moriah, 43° ; open air 54° . May 27.

At Westport, spring, 45° ; air 65° . May 31. Another, 43° ; and another 40° ; air 64° .

Mineral spring at Westport, 44° ; air 56° . May 30. Deposits tufa.

Well at Westport, covered and in the shade, 42° ; air 69° . June 1.

Variation of the Magnetic Needle.

The observations were made with a theodolite which reads to a minute of a degree. The results were obtained by observations on the pole star at a given hour in the evening. The time, though not probably the exact local time, still approximated very nearly to it, so that very little error can arise from assuming it as the true time.

Variation of the Magnetic Needle at Champlain, Clinton County, 29th June, 1838, $9^{\circ} 30'$; time, 9 o'clock and 30' P. M.

At West Chazy, $9^{\circ} 21'$; 8 o'clock, $45'$. July 3, 1838.

At Keeseville, $8^{\circ} 40'$; 10 o'clock, July 6, 1838.

The variation at Keeseville, in 1825, as obtained by E. F. Johnson, Esq. was $7^{\circ} 30'$.

At Warrensburgh, $7^{\circ} 15'$; 10 o'clock. July 15, 1838.

The preceding pages embrace the most important facts which have fallen under my observation during the last season. That they may contribute to the promotion of agriculture, and in some small degree to the advancement of science, is the wish of

Your most

Obedient servant,

E. EMMONS.

Albany, February 1, 1839.

THIRD ANNUAL REPORT

Of the Geological Survey of the Third District, by Lardner Vanuxem.

Montgomery, Herkimer, Oneida and Oswego, were the counties which formed the subject of the last report. It was in consequence of those counties presenting but few of the attractive valuable mineral products, those which do not enter into the composition or form rock masses, but are the associates of certain rock masses, that it was thought better to adopt a more general plan than the one contemplated at the commencement of the survey.

With few exceptions, all the mineral wealth of the Third District form portions of the great series of rock or geological masses, the right understanding of which requires that the position which each kind holds in the series, should be known. The same reasoning applies to those mineral substances which do not enter into the composition of the series, from making but a small part thereof, but have a determinate place therein; and the same likewise may be said of those products derived from certain materials of the series, and hold a position extraneous to them. Such are calcareous tufa, lake marl, bog-iron, and we may include the products of alluvium likewise.

This blending of the two methods in the annual reports, greatly facilitates the Geologist of each district in the collecting of materials for his final report, being aided not only by his own eyes, but the eyes of his co-associates. For these and other reasons, we shall continue the same plan in the present report.

It cannot be said that any of the counties have been finished or thoroughly examined, for it often happens from the materials which form rocks, having been furnished from different and often opposing geographical points, that a rock which is well developed or forms a thick

mass in one county, may in its prolongation, so thin out as to attract little notice in another county, producing this result, that should the examination be commenced in the latter and not the former one, it may be passed over with but slight attention, requiring, therefore, a re-examination, before the whole series of the county can be completed. Of the truth of this remark, Western New-York furnishes some remarkable examples.

The limestone of Niagara, Lockport and Rochester, estimated by Mr. Hall, at 150 feet thick, thins out in its progress east, so as to be but two or three feet in thickness near the Sauquoit in Oneida county. The mass which lies below the limestone, the "calciferous slate," is about 80 feet thick in the western part of the Fourth District, and seems to disappear before reaching Madison county, and reciprocally the "millstone grit," which is thirty and more feet in thickness in Herkimer and Oneida, gradually attenuates in going westward, being from four to five feet at Rochester. The materials of which this rock is formed, gravel and sand, prove that their source was eastwardly. In Herkimer and in the eastern part of Oneida, the pebbles are larger and the mass thicker, the sand increasing going west, whilst the pebbles diminish in the same direction. Thus, in Cayuga the pebbles are rare, and I know not that they have been noticed in the "gray band" at Rochester, the continuation or equivalent of the "millstone grit."

The counties principally examined were Madison, Onondaga and Cayuga. The whole boundary between the Third and Fourth Districts was likewise examined conjointly with Mr. Hall. Besides, many portions of the southern counties were visited preparatory to a more thorough exploration the coming season. In this report, we shall not treat each county separately, but connect the whole, in order to avoid repetition.

Proceeding up the Mohawk valley, a rapid rise takes place to near Utica, from which point commences the long level of the Erie canal; no great change comparatively of level takes place thence proceeding west, and in a NNW direction, throughout the Third District.

Though the general upper level is attained near Utica, yet we are not upon the top of the plane, until we are a little to the west of Rome; there the waters pass in opposite directions, some to reach the ocean by Lake Ontario, others by the Mohawk and Hudson.

Where the bottom of the valley ceases to rise, its sides begin to recede from each other, and to the south and left in proceeding west

over the level we have the continuation of the great elevation of Herkimer and other counties to the east, its line of continuity much broken in its progress through the Third District, owing to numerous streams of water flowing from the south. To the west and north the limits of the level lie not far from a line passing from the north of Rome through Salmon creek, in Oswego county.

The area included within the limits mentioned, presents no elevation excepting those formed by alluvial materials only, if we except the plaster hills which skirt the northern side of the great elevation, and a few other limited projections of the same great mass. The alluvial materials abound more within this area than in any other part of the Third District, consisting of clay, sand, gravel and larger stones, either filling up excavations, some at least 200 feet in depth, or rising into hills and ridges.

The area occupies a portion of Oneida, the northern parts of Madison, Onondaga and Cayuga, and the whole west and south portion of Oswego county.

Were the whole of this ancient level or area stripped of its alluvial materials, we should find that the surface presented a lake bottom, appearing as though Ontario and Oneida once had a higher level, their waters uniting and covering the whole surface. That this level or area has been the theatre of great erosive action is evident from many facts collected in the progress of the survey, facts all important to a right understanding of the salines of Onondaga; all which subsequently will be given.

In Herkimer the great southern elevation consists, as was mentioned in the second report, of the green shales, the "millstone grit," the proterean group, the red shale, the water limes, the upper limestones and the "pyritiferous rocks." All the lower, or first named ones, appear merely as outcrops, forming as it were the south wall of the valley, their northern ends alone to be observed with such other parts as the small valleys or ravines which have been excavated in them have exposed. From beneath these rocks the black shale appears, and forms the bottom of the valley.

The elevation in its progress through Oneida, in consequence of the dip of its rocks to the southwest, the rise of the valley and the lower rocks rising and passing abruptly to the north from the influence of the great primary mass to the north and east, causes the green shale to appear in the area and gradually take the place of the black shale. This

in its turn cedes its place in like manner in part to the "millstone grit" and the protean group, causing these two latter masses to occupy the southern half of the area. Whilst the green shale is extending itself through Oneida, other rocks appear which have no existence in Herkimer. These rocks commence between Utica and Rome, and cover the northern side of the area. They appear from under the "millstone grit," and from above the green shale of Herkimer, and of the same rock in the creek to the east of Utica, or in other words, from between the two rocks. These rocks are the shales and green sandstone of Salmon river, and the red sandstone of Oswego; they cover a considerable portion of the north part of Oneida, the greater part of Oswego, and the red sandstone forms the triangle in the northern part of Stirling, in Cayuga, appearing immediately under the "grit."

The further progress of the elevation causes in Madison, another change; the red shale which rests upon the protean group, adds another member to the area. With the exception of the curve from Rome, the entire length of the Erie canal in that county is excavated in the red shale. And the final progression of the elevation in the Third District, causes portions of the gypseous hills of Onondaga and Cayuga, they being the equivalents of the water limes east of Oneida creek, to form as it were portions of the same plain. With the Third District, our observations should end; but a general idea of the whole elevation is required, in order that the report of the salines of Onondaga should be fully understood, and all doubts as to the superposition of the rocks should be removed, which could not be, unless the whole range should be given. Besides it may be said, that no part of the geology of New-York, judging from what has been written, is more obscure than the part we are treating, and its importance requires all the light that can be thrown upon it.

Near the Cayuga lake, the rocks are at their point of greatest depression, and from thence rise, going west. The effect of which is to cause all those rocks which underlie or compose the area or depression to again reappear as an elevation.

Thus the red sandstone of Oswego which covers the triangle in Stirling, Cayuga, which cannot be over 15 feet above Lake Ontario, forms the lower falls of Rochester, rising nearly 100 feet above that level. The red sandstone is followed by the gray sandstone, quarried near the line of the county, between Martville and Hannibalville, and of Hulme's quarry in Stirling, being the "millstone grit" of Oneida, and the "gray

band" of Rochester. The rocks succeeding to the grit, are the green shales, the iron ore beds, the calcareous "fire stones," &c. &c. of the protean group; the whole terminated by its upper member, the concretionary rock of Oneida, which with its immediate associates appear in the low level near Oneida lake, passing thence through the towns of Cicero, Clay, Lysander, Ira, and Victory, in Onondaga and Cayuga, thence onwardly, and finally forming the upper falls of Rochester, the rock of the great excavation of Lockport and the falls of Niagara.

From the information obtained from Mr. Hall, of the geology of the north side of Lake Ontario, we learn that the southern limit of the Birdseye and the Trenton limestone is near Newcastle, opposite to Rochester; and the southern limit of the shales of Salmon river is at Credit river, about fifteen miles west of Toronto; both extending westward in the same direction as in this State. From these facts we are enabled to solve points of the highest importance, and as obscure as were the connection of the series of rocks which form the great south elevation of the Mohawk valley, with those of the middle region and those of the mountain ridge or terrace of Niagara.

Red Sandstone of Oswego.

The red sandstone of Oswego is the lowest rock of the three counties whose examination forms the subject of this report. The counties are, Madison, Onondaga and Cayuga. The red sandstone is only found in Cayuga in the town of Stirling, underlying the north half of the town. It is not to be seen in many places, owing to its alluvial covering. The locality where it is uncovered to the greatest extent, is on Little Sodus creek, at Stirling centre, where it is likewise quarried for building. From the centre it extends along the creek to McFarlane's mill, a mile south. At the centre, a brine spring rises by the side of the creek, through a fissure in the sandstone. There is another spring also near the mill. At both places, salt was made, and of similar quality; both had a sharp taste; that of Stirling centre was highly coloured with iron, which mineral the spring deposits. Care being taken to purify the salt at the mill as to colour, it was white.

The red sandstone is the lowest rock, geologically, of New-York, which contain brine springs of sufficient purity to be manufactured into salt. From the eastern part of Oswego county, to the Niagara river, numerous brine springs are found in this red sandstone.* All the springs in the Third District, which are found in this rock, and there

*See Report of Fourth District.

are several in Oswego, yield the same kind of sharp tasted salt, described as the salt petre taste, and all highly coloured with iron; characters different from the salt of the brine springs which belong to a subsequent deposit, and show a difference of source or contamination from being deposited with a different rock.

Near Little Sodus bay there is another salt spring, which must arise from this rock. It is not far distant from the one described in the first report of this district.

Gray Sandstone of Cayuga.

To the south of the red sandstone, and reposing upon it, is a gray sandstone, the lower part often variegated with the red oxide of iron, and the upper variegated with green shale, resembling a coarse kind of "fret work." This mass for position corresponds with the "mill stone grit" to the east, and the "gray band" to the west. It is quarried in two places. One quarry, owned by Mr. Bentley, on the road between Martville and Hannibalville; the other by Mr. Hulme, and is between Little-Sodus creek and the line of Wayne county.

Protean Group.

The gray sandstone is followed to the south by a series of green shales, with thin layers of sandstone with fucoids, with thin layers of fossiliferous limestone used as firestones, and with the red oxide of iron, the well known products of the protean group. These products are best seen on Little Sodus creek, at Martville, and for about half a mile lower down the creek; also along the south shore of Oneida lake, commencing on the farm of Robert Bushnell, west of Joscelin corners; at the corners, and likewise at Oneida post-office. From thence eastward, from being buried under the alluvial, or more probably washed away, they do not appear until near Verona, excepting on the land of Thomas Donnelly, on the road between Canastota and the State bridge.

The iron, which is the same in kind with the Verona and Westmoreland ore, designated in the report of Dr. Beck as the "lenticular clay iron ore," is found in Cayuga to the south of Hulme's sandstone quarry, on the farm of Peter P. Van Patten. It occurs on and near the surface, fragments being often ploughed up. This bed seems to be the lower, or the Rochester mass, and not the one near the Wolcott furnace, which is the second mass. Iron ore of the same kind is said to be found in the creek near Martville, which I had not time to find, the locality being a secret. I have no doubt that it exists there, for the rock in the bed of the creek at the village, corresponds with the roof of the ore

bed at Wolcott furnace, and the roof of the ore bed worked for the Tayberg, Lenox and Constantia furnaces, near Verona, and will be found between the village and the mill, a half a mile below. No ore has yet been found in Onondaga, the first indication east being in Madison, at Robert Bushnell's, in the loose materials of the bank above his stone quarry on the lake shore; again about three-fourths of a mile beyond, at Joscelin corners, between the road and the lake. It appears to be in two layers, over a foot each, and of pretty good quality. It is exposed along a line nearly horizontal, of several hundred feet in length. This ore, it was said, was taken to Constantia furnace, but no very favorable opinion of it given; probably owing to the specimens having been taken from masses which had for ages rested upon the surface, and had resisted all change, owing to carbonate of lime, which is an associate of this ore, and to which its hardness is principally owing. Had excavations been made, and the softer varieties been chosen, a different opinion would have been given. So far as the eye could determine, I was satisfied that much of the ore which was exposed upon the surface, so far as a judgment from the eye could be formed, seemed to me to be little inferior to the Verona and Westmoreland ore, and fully equal to the ore of the same kind quarried in Pennsylvania, near Danville, on the Susquehannah.*

Indications of the same red ore appear in the bank of the lake, on Mr. Munger's farm, at Oneida Lake post-office.

All the localities on the lake shore are in a right line, but from thence the line in which the ore is found is on a curve, passing to Verona. The ore being on the farm of Thomas Donnelly, in the town of Lenox. It is generally found below the surface about plough deep. Many masses have been thrown up, some lying loose, others piled up. It is in solid masses and in a state of disintegration, colouring the surface of the ground of a blood red. This is the purest kind, the carbonate of lime having been removed by solution in water. The ore covers an area of about 80 or 100 acres, slightly raised above the adjoining allu-

* The ore near Danville corresponds in its fossils with the, second bed, that is, Donnelly's in Lennox, Bennett's in Westmoreland, and the bed which once existed above the Tayberg, Constantia and Lenox bed in Verona, which has been destroyed; but the numerous masses and fragments which have been uncovered in grading the rail-road, show that it had there existed. The common or prominent fossils, are the *Strophomena rugosa*, *Atrypa affinis*, *Leptæna punctulifera*, &c. &c. The encrinal rings with their peculiar rounded edges proving partial solution, are common to the beds of both States, and the characteristic fucoid of the protean group is found just below Danville. The perfect identity of the Pennsylvania and New-York bed show the extent of this thin deposition. It has long been known that the iron ore beds in New-York extended from Herkimer to the Genesee river, and now we know that one of them extends south 160 miles.

vial land on its north, east and west border. The solidity of the ore appears to be the cause of its not having been swept away with its original associates and its superincumbent masses.

From all observations made, it is certain, that there are two distinct beds of red oxide of iron in the protean group, arranged in lines parallel to each other, extending from Herkimer to the Genesee river. These beds are about 25 feet from each other, and from 1 to 2½ feet in thickness. They are not always present in every locality, for sometimes the one and sometimes the other, and even both, are wanting. A circumstance readily conceivable over so great an extent, with masses comparatively thin, where opposing currents both general and partial may have existed, and where the surface over which the iron was floated may not have been level.

It has happened, no doubt, frequently, that the surface over which the iron was floated admitted of its fine particles to escape, that is, to be absorbed by the floor upon which it was deposited. In this way we can explain the stains of iron upon the shales of Little Sodus bay, and of the mill at Martville, &c. &c. A whole bed could not disappear unless passing over coarse sand, for the grains of which the greater part of the ore consists, must have been formed at the point of Thermal action.

The concretionary limestone and its blue shale, as was made known in the second report, terminate this group. The limestone is first met with on the farms of Mr. Hood and Capt. Adams, south of Donnelly's ore bed. The shale and a more compact kind of limestone, were thrown out in digging a well between Donnelly's and the concretionary rock. Near to Joscelin's corners, on the farm of Enos Hubbard, it is burned for lime; so also in most of the towns of the Third District through which it passes. This limestone is readily known by its well defined characters, and is readily traced by its numerous quarries opened in the towns of Cicero, Lysander, Ira and Victory, all which are arranged in nearly an east and west line.

In some of the quarries of the limestone there are small geodes whose sides are lined with crystals of carbonate of lime as at Lockport; in others, but more rarely, the limestone encloses globuliform masses of pure white gypsum, and in others we find that singular concretionary rock which forms the upper part of the Lockport and Niagara limestone, being the terminal mass in the Third District, and from which its name was in part derived. In the upper part of the concretionary limestone, oolite is often found, showing that some of its particles were subjected

to the same cause which gave rise to this appearance common to the iron ore of the group.

Of the fossils of this rock, there are two which have been found only in this rock. The *Orthis bicostata* is abundant, occurring in Oneida, Onondaga and Cayuga. The other is the *Pterinea gibbosa*, which is not common or abundant.

Red Shale and the Water Limes of Herkimer and Oneida,
which we shall call in this report, the *saliferous group of Onondaga*.

This group comprises four deposits, between which there are no well defined lines of division, but for practical purposes, the divisions are obvious enough.

The first or lowest is the red shale; 2d. The lower gypseous shales, the lower part intermixed with the red shale, the red shale ceasing entirely with this mass; 3d. The gypseous deposit, which embraces the great masses quarried for plaster, the hopper shaped cavities, the "vermicular limerock" of Eaton, and other porous rocks; and 4th, and lastly. Those rocks which abound in groups of needle form cavities, placed side by side, caused by the crystallization of sulphate of magnesia, which may, from that circumstance, be called the magnesian deposit.

These masses occur from the eastern part of Madison to the extreme western limit of the Third District.

The whole of the group, leaving out its gypseous and magnesian constituents, may be stated generally, to be of argillaceous materials, meaning thereby, silex and alumine in the state of indurated clay, and of carbonate of lime. The former abounding in the lower or red shale mass, diminishing upwards, whilst the carbonate of lime which is but perceptible in the lower part, increases and is in great excess towards the upper part.

From the limestone of the protean group, we pass, going south by a few thin beds of alternating green and red shale, and a thin bed of hard green sandstone, to the great mass of the red shale. At least such are the results of observation throughout the counties of Herkimer and Oneida, where these masses are presented in the wall of the great elevation, and we have no reason to believe that any change has taken place, other than a thickening or thinning of some of the lower beds, not

knowing as yet with certainty the direction from whence the whole of the materials of those beds were derived.

That the red shale increases in thickness going east from Herkimer, is certain; but the point of its greatest thickness is not ascertained. The boring now in progress at Salina may furnish information that will determine it.

The red shale forms the base or lowest mass of the salt springs found along the course of the Erie canal, in the Third District, and has often been confounded with the red sandstone of Oswego, and its prolongation the sandstone of Rochester and Niagara. The two rocks have no connection with each other, being separated by the protean group, nor resemblance, excepting that the same ferruginous material colours them both, and both are connected with saliferous sources.

With the exception of the curve which the Erie canal makes in its entrance into Madison from Rome, its whole course in that county has been excavated in the red shale. From the canal pursuing a more southern route in Cayuga, and from the dipping of the red shale to the southwest, we find that only in a few places in Onondaga, where the canal curves to the north, that it traverses the red shale. These points are its entrance from Madison towards Kirkville, the curve at Bellisle, and the great curve which passes by Canton to Jordan. Near to Jordan, the red shale is exposed on both sides of the canal for a mile or more.

The red shale, with its green spots, noticed in the report of last year as existing to the east of Vernon Centre, is well exposed in the road leading to Oneida Castle.

The same variety exists at Salina on the north side of the canal on the road to Liverpool. Likewise at Baldwinsville, the canal there being excavated in this kind of red shale. The green spots frequently present a nucleus in the centre. When examined by the microscope, the green spots exhibit points which seem to be iron in a lower state of oxidation. Some of the shale is mottled or marbled, some hard, but all the different kinds here as in other parts of the district, speedily crumble by exposure to atmospheric agents.

A boring in the red shale, made by Seth Hunt, for salt water, near to the salt spring noticed by Dr. Beck, at Lenox, on the land of Capt. Clark, presents several important facts. The depth attained was 196 feet, 190 in red shale, and 6 feet in hard green sandstone, which took

several days to bore the six feet. When the boring commenced, the saltiness by the instrument used was $2\frac{1}{2}^{\circ}$, and towards the close 9° . No stream of water was met with. It was abandoned on account of the breaking of the auger, which could not be extracted. This information was communicated by Capt. Clark.

This boring proves that the red shale increases greatly in thickness in its progress west from Herkimer. So far as judgment could be formed from the eye, supposing the dip not to be great, its thickness at Lenox could not be less than about 400 feet. The boring exists in a depression to the north of the canal; the hills to the south of it, which are of red shale, are about 200, giving a total thickness of nearly 400 feet.

The red shale, though of great extent, traversing the counties of Herkimer, Oneida, Madison, Onondaga and Cayuga, of the Third District, presenting a thickness of from 1 to 400 feet, yet no where has a fossil been discovered in it, or a pebble, that I am aware of, or any thing extraneous, excepting a few thin layers of sandstone, and its different coloured shales.

Second Deposit.

It was mentioned in the second report of this district, that the upper part of the red shale was far more varied than the lower part, owing to its layers or beds intermixing or alternating with those of the mass above. On the road towards Lenox from Clockville, near the turnpike, there is one of the best localities for the observance of the various alternation of the different coloured shales. Thus we have at top of the mass in descending by the road, the green, then red below it, green, red, blue, green and yellow, this latter by exposure to the air; then red and green in thin layers, being several repetitions, and finally red the lowest visible mass.

This second deposit seems to be very variable as to the colour of its shales. In some red predominates, in others the green, bluish and gray, and in some the red is wanting altogether. In this deposit, gypsum frequently occurs in fibrous masses, either reddish or of a salmon colour; colours peculiar to this deposit. The quantity of gypsum in this deposit seems to be limited; all the quarries I saw belonged to the third deposit. It is in recent excavations that we have the best opportunity of examining the product of this mass, in consequence of the ready alteration which some of the shales undergo by exposure to the air.

Near to Sodom lake, on the rise of a hill about 50 feet above the canal, and on the road from the foot of the lake to Manlius Centre, Eliakim Smith had commenced a large well for water in this mass. The rock passed through gray and greenish marl, with white and red fibrous gypsum. All the products thrown out were like those which I saw in the digging for salt water in the salt valley near Abingdon, Virginia. The same products, too, were obtained in another well about 55 feet deep, on the road to Orville, about a mile east of Syracuse, and are observable likewise in the road descending to Orville from the latter village.

The second and third deposits of the saliferous group of Onondaga have a common character, that of being exceeding permeable to water. This fluid cannot be obtained on any of the hills composed of either mass where the well sinks into them, unless sunk to the level of the water courses; a fact which readily explains the absence of all brine springs above the water level of the country.

Though I diligently sought for fossils, knowing, from twenty years' experience, that their importance was paramount in Geology, yet it was only in one spot that I succeeded in discovering some. They were a Cytherina, about half the size of those found in the upper and lower groups. They occur in a thin layer of "calciferous slate" of Professor Eaton, those thin drab-coloured layers which make up so large a portion of the third deposit, and the upper part of the second deposit. The locality is near the top of a hill going by the south side of the canal from Jordan to Peru. In descending the hill towards the lower part, repeated alternations of red and green shales occur, characteristic of the union of the first and second deposits.

Third, or Gypseous Deposit.

This is the most valuable mineral deposit of the Third District, and the most important, not only on account of its "plaster beds," but because it is only in this deposit that we have positive evidence that *salt* has existed in this group in a solid state; and that it is the only known source from whence the brine springs of Onondaga and Cayuga could have been derived.

Besides those primary products, gypsum and salt, there are others but of little comparative importance, excepting to those to whom a knowledge of proximate geological causes is a predominant feeling. These products are the "vermicular rock" of Prof. Eaton and other

analogous ones. These products throw the greatest light upon the origin of the saline materials of the group, and of the whole group we would say, were this not a practical report. These products furnish a series of facts, when well considered, will contribute more towards connecting those causes called volcanic action, now in operation, with similar causes, which must have existed and operated from the time that there was a solid crust, but operating with materials differing from those now generally used, would produce different products, and the greater the difference of material, and the greater the difference of age from causes hereafter to be mentioned, the greater would be the difference in the products; and hence the great difficulty of recognizing the products of volcanic action beyond a limited period.

That difference of age causes the products of volcanic action to be different, is evident in the ancient province of Auvergne, in France. There there are three distinct eras or ages of volcanic action, each different from the other. The first or oldest, formed of porphyries and other feldspathic rock; the second of basalts; the third and last of "gray lavas." This latter kind alone in currents and connected with craters. When, too, we bear in mind that the state of the earth's surface was wonderfully different from which it now is, and at no very remote period; nay, that even in comparatively recent times, "the mountains were brought forth," we are not surprised that we so quickly find ourselves at fault when we endeavor to extend our actual knowledge of known volcanic action beyond the tertiary periods.

The great mass which encloses the "gypsum beds," is the "calciferous slate" of Prof. Eaton, a name which he had likewise applied to a somewhat similar, but high fossiliferous deposit which is placed between the layers which contain the iron ore beds and the concretionary or Lockport limestone mass. The two slates so different from each other were considered to be one and the same; nor need we wonder at their union, since few are the observers that have not fallen into a like error. These "slates" of the gypseous beds, bear a strong resemblance in their drab colour, the thinness of their layers, by their composition of carbonate of lime and argillaceous matter with the deposits which form the plains of the table lands of Mexico, and the saline materials of both point to causes of a like nature.

The gypsum in no part of the Third District form layers or beds; on the contrary, it occurs in insulated masses, as though the particles of each mass had been attracted by a common centre, but greatly modified by disturbing causes. There seems to be two distinct ranges of "plas-

ter beds," generally separated by the "vermicular rock," the "hopper shaped cavities," and other but less characteristic masses.

There is a somewhat impure limestone which forms a part of the third and probably of the second deposit, not being able to assign one fixed position for it. It has a peculiar appearance when weathered, like that of having been hacked by a cutting instrument, and with some regularity. This is caused by cracks in two directions, giving a rhombic surface. Solution taking place at the cracks, and the cracks not being continuous nor regular as to distance, the appearance above mentioned is produced. The stone readily breaks in the direction of the furrows, and the fracture shows stains or marks of infiltration.

Gypsum, or plaster, is extensively quarried in Madison and Onondaga counties, along the line of the Erie canal, but in Cayuga there is little plaster obtained excepting on its lake shore.

In Madison, all the plaster quarries are in the towns of Lenox and Sullivan, and all to the south of the Erie canal. Those of Lenox, on the Cowassalon creek, are Cobb's, Merrill's and Wright's. On the small creek which passes by Clockville and reunites with the Cowassalon, are the quarries of Judge Seeler and Mr. Lawrence. In the same broad range with these to the west, are those of Kennedy, Brown, Bull & Kellogg, &c. &c. In Sullivan, I examined only those near the village of Chittenango, the old Sullivan or old Patrick bed, which belongs to the first or lower range being to the east and north of the village, and Van Valkenburgh's, which is on the creek road to the falls, and belongs to the upper mass.

The old Sullivan bed was the first plaster mass that was discovered. It was worked during the war, and the plaster was sent to the Hudson and to Philadelphia. It is not now worked, in consequence of the thickness of rock or calciferous materials which cover the plaster. The following diagram will show the contents of the quarry at the west end of the hill.

-
1. "Vermicular rock, 2½ to 3 feet, pores large. In the quarry east, the pores are large and small
-
2. Mass of an olive colour, much altered, 2 feet thick.
-
3. Variegated drab and blueish like marble, slaty as to layers, with numerous oblique cracks, 10 feet thick.
-
4. Dark olive and brown mass, much altered, 20 feet to the bottom. In this the plaster was quarried, and when last worked, at the lower part.
-

Bull's quarry, to the left of the road from Sullivan or Canaseraga to Clockville, is one of more interest. It is like the old Sullivan, in having a thick, superimposed mass upon the plaster, which consequently diminishes its value, from the expense of working being too great, requiring the whole of materials which covers the plaster to be removed. The owners, therefore, of such beds cannot compete with those whose gypseus masses are near to the surface of the soil. The following section of the quarry shows an addition of more "vermicular," or porous rock, and the presence of hopper shaped cavities and fossil remains.

7. Third or upper alluvial of Chittenango.

6. Porous blue limestone rock, ("vermicular,") pores larger than usual, and slightly compressed, 3 feet.

5. Slaty, variegated, gray and blue striped, &c. with a few fossils. This mass is the same, with No. 3, of old Sullivan, 10 feet.

4. Thin layers brownish, with a few pores, the whole seeming to be decomposed, 3 feet.

3. Thicker layers, harder, not so dark coloured, with hoppers, and at its intersection with No. 4, the lower porous mass, pores small, 4 feet.

2. Light coloured, like No. 3, with hoppers, 2 feet thick.

1. Like No. 4, dark coloured, with gypsum; the mass to which the lower gypsum seems to be confined.

The fossils are few in number, consisting of fucoides resembling our small spear grasses, if charred; also a few bivalve shells, the *lingula limosa*, and two or three undescribed thin shelled bivalves.

In this quarry we are presented with a phenomenon observable in the greater number of plaster quarries of the lower range, and to which in part the common opinion entertained, that plaster is still growing, owes its origin. This appearance is an arching of the layers which cover the plaster, which is more or less regular, as the surface of the plaster curved with more or less regularity. It is usually the case that the mass or rock of the arch is full of cracks, owing to the force exerted by the plaster in its expansion upwards.

On the top of the hill to the right, going to Clockville, are the "plaster beds" of Mr. Brown, about a mile and a quarter from Clockville. The quarries present a range of detached masses more or less round upon the top, but generally smaller and with a flat surface below. The whole of the gypsum is enclosed in the usual thin layers of dark brownish, and apparently a much altered rock. Above the gypsum are a few of those which immediately overlie it, exhibiting the hopper shaped cavities, and the porous or "vermicular" rock, but all in no great quantity, some of the plaster masses being at no great depth below the soil.

The plaster hills range from east to west through the county, extending south of the turnpike for above three miles. The hills are more or less round, rendering some portions of their plaster accessible, the layers in which the masses exist having but a slight inclination.

In Onondaga there are some appearances of working for plaster at the north ends of the hills at Hartsville, and L. H. Roach works a plaster bed in the village. He remarked that there were as many as three courses of plaster. I saw no hoppers or porous rock in his quarry, but there were fragments amongst the rubbish around.

Further west on the turnpike towards Syracuse, are the quarries of Groves and Everson. Besides these quarries in Manlius, are those of Balsley, Potter and King.

In the town of De Witt we have the quarries of Dunlap, Brewster, Wilcox, Burks, Dr. Smith, Edwards, Hurd, Reals, Rumley, and of Hungerford. This latter exhibits the best gypsum that I saw in Onondaga. It belongs, I should judge, to the upper range; it has no porous rock, and was followed about 12 feet above by the terminal mass of the group. This quarry presents a fine arching over the gypsum, the elevation being considerable, and the arch unbroken. This elevation of the layers is an unerring guide in the search for gypsum; it exists in no part of the range without a plaster mass being under it. Hungerford's quarry is about a mile or two below Jamesville, on the road to Orville.

After leaving the town of De Witt, there are few plaster beds that are opened to the west in Onondaga. The greatest quantity that is regularly quarried is by the rail-road that goes to Split rock. The next that I saw was that of Mr. Hunt's to the southwest of Syracuse, near Onondaga valley.

The greatest exposition of plaster is along the Nine Mile creek from Camillus to a mile or two beyond the great embankment. The plaster beds were laid open by the grading of the rail-road from Syracuse to Auburn. Here the dark coloured mass which encloses the lowest range can be well observed for some distance; also the hopper cavities which are above that mass; they are followed by gypsum, and lastly the porous or "vermicular rock," forms the upper part of the whole. This latter is four feet thick.

Throughout the three counties where plaster exists, I have no reason to believe that it is more abundant in one part than in another part, the difference being merely apparent arising from the greater ease of extraction, caused by denudation, which by removing the superincumbent portions, admitted also of less accumulation of rubbish upon the hill sides.

Some idea of the quantity of plaster which the region contains, may be formed by the report of the engineer of the Syracuse rail-road, Mr. Edwin F. Johnson, dated June, 1837. The whole of the plaster was obtained from the hill side going from Camillus to Auburn, and to that period "about 40,000 tons had been obtained, estimated to be worth, in the aggregate, \$35,000." Mr. Johnson further remarks, "that the location of the rail-road is such, that the gypsum is exposed at various points in the excavations for the distance of five or six miles. In some places the bed of the rail-road is composed entirely of that material."

Very little plaster is quarried between Nine Mile creek and Owasco river, and no quarry opened in Elbridge or Brutus that I could hear of. In the town of Mentz, about one and a half miles below Troopsville on the Owasco, is a quarry belonging to Mr. N. Marble, of Port Byron. It belongs to the upper range, and this is the last excavation for gypsum before reaching the quarries at Cayuga bridge.

Gypsum is abundant at Cayuga bridge; but one quarry worked, that of Mr. Williard. Mr. Titus has opened a bed a little north of the road, but has not proceeded further.

The beds at the bridge all seem to belong to the upper mass; they are wanting in the hoppers, in the "vermicular rock," the want of arching in the layers above the plaster, and they are accompanied by a class of cavities which I have only observed in those masses which hold the highest geological position in the third deposit.

South of Cayuga bridge, and about two miles north of Union spring, and near the lake shore, are the five plaster quarries of Richardson, Par-

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tenheimer, Cress, Howland and Yawger. There is another quarry to the east of all these, owned by Mr. Thompson. These quarries lie farther to the south than any known in the district, extending with the lower deposit found at Montezuma, along a north and south line of about thirteen miles. For quality they are superior to any in the deposit, the masses also are larger, yielding often from 300 to 1,000 tons. They have all been denuded, for they are surrounded and covered by the most modern, the third, or upper alluvial of Chittenango, presenting none of these terminal associates, if we except the mass in which it was originally deposited, whose layers occasionally cover portions of the plaster. The matrix of the gypsum is here blackish in colour, earthy in its aspect, often variegated, sometimes contains lamellar gypsum, and more rarely a little pure sulphur. This mass has the appearance of an impure gypsum, and is considered by the quarrymen to be an incipient plaster, requiring time alone to make it perfect.

Some of these quarries are a few feet below the lake. They furnish about 10,000 tons yearly; delivered at the head of the lake from \$1.50 to \$2 per ton.

Richardson's quarry is the first quarry met with going south. It presents a face of about 100 or more feet in length, and from 18 to 20 thick. It is in solid, though not continuous layers, apparently horizontal. The surface is uneven, as usual with all the plaster masses, compact, of a dark colour resembling a variegated marble. In the fissures of the upper part, and sometimes in its interior, particles of sulphur from the size of a pea to an inch are said to be found, also small globular masses of white granular gypsum, which is taken for sand. On the top of the plaster, in parts, there is the mass before mentioned, which is considered to be the commencement of a new crop. The whole is covered by 8 or 10 feet of modern alluvial. The bottom of the quarry is a dark slate, or slate with nodules of plaster, resembling those of the upper quarries near Chittenango, and on the road to Jamesville. This floor was bored to the depth of 24 feet, all which was said to be in plaster.

The largest mass of plaster is at Yawger's, presenting a continuous face for several hundred feet, and from 15 to 25 feet thick. Mr. Yawger stated that plaster had been used there since 1811, without diminution of its good quality; a bushel of plaster yielded in produce what was equal to the cost of a ton.

In the examination of nearly every quarry in the three counties, these were the facts observed. The lower range of "plaster beds" are enclosed in a dark coloured, and to appearance, a somewhat altered mass, in which I was informed that Dr. Beck had found 20 per cent of magnesia in an analysis made from that of the Nine Mile creek. Resting upon this mass is the series which contain the hopper cavities, noticed by Mr. Conrad, and Dr. Beck particularly. Also the porous or "vermicular rock," and the organic remains. These latter I could only find in one position and in two localities. The porous rock seems to be disposed in two different ways. In one forming a bed, holding a position more or less fixed, and apparently extending over a large portion of the gypseous region. In the other, the masses are limited in extent, without fixed positions, appearing to have been deposited at irregular intervals.

The cavities of these porous rocks have no analogy whatever with those derived from organic remains, nor are they referable to any porous rocks other than those of volcanic origin, and I should suppose that, were they not composed of carbonate of lime chiefly, but of the usual siliceous and argillaceous materials, the igneous origin would have been given to them by their first describer.

The common opinion that the plaster is still growing, is set at naught by the fact, that it is as fully formed where alluvial soil covers its masses, as it is where layer on layer of its own deposit is heaped upon it. No difference can be perceived in either. No increase, I should suppose, could have taken place since that period when it rose from the deep, to which it had been depressed by the masses which originally were deposited upon it, and which subsequently have been swept away.

The arching over the gypsum is readily explained from the facts which experience with "water limes" have given to us; and a fact noticed in a quarry of water lime, south of Chittenango, verifies that experience. That certain materials or mixtures will harden or sett, when others will be soft and yielding, may be considered fully established by the many experiments made with good and bad water limes, and by substances taken for such, and likewise that there is a difference in the time of setting of the different kinds. This is admirably shown in a layer of water lime back of Chittenango. The layer was about eight inches in thickness. The note I made was this: "Some parts of a course of water lime show a local disturbance, by which it is evident that a derangement can go on which extends but to a little distance from the action, and show that the parts disturbed were the first to ag-

gregate." Within the layer of 8 inches, are two others more compact, of about an inch thick. These have been broken in many places, so that the parts no longer hold their original parallels, the enveloping part showing but few signs of disturbance.

In the material which covers the gypsum of the upper range, the arching is but perceptible, owing to its soft nature, whilst in the lower range the arching is common, and formed of harder, fine grained and a compact material. A considerable portion of all the arches resemble in fracture the material of which the porous rock is composed. These facts show that a hardening or consolidation of the matter of the arching took place before the gypsum wholly separated from the mass in which it must have been diffused, or, in other words, before it acquired the form in which we find it. On the contrary, where the arching does not exist, the particles which compose it, when pressed upon by the forming plaster, would have retired to the place of the least resistance, as is instanced in the material which encloses the two thin layers in the eight inch bed of the water lime of Chittenango.

There are two localities in which the porous rock is found in greater thickness than elsewhere met with, and merit examination from the connection with the immediate salt region.

The one is on the road from Amboy and Bellisle to the turnpike, a few miles west of Syracuse, immediately back of the tavern, and in the rise to the top of the hill. The other is on the Footsheet road, ascending from Syracuse to Mr. Jephth Colvins.

At the first locality, towards the bottom of the hill, there are about twenty feet of these dark porous layers, and of configurations frequently met with elsewhere, probably belonging wholly to common salt or else to sulphate of lime, not having yet determined. To these others succeed, and then those with vertical fissures, with a few small thin shelled bivalves, similar to those of Bull's quarry, also a few small fucoides. The terminal mass is the "vermicular rock," from four to five feet thick.

The locality near Syracuse is of greater interest, for besides the two porous masses of the hill to the west, there exist at no great distance below the upper porous rock, a series of highly crystalline aggregates, wholly different from every product yet met with in the Third District, if we except the dykes noticed in the last report, and a few thin ones yet to be mentioned, which are found near Ludlowville, above half a mile east of the village. The description of these crystalline rocks,

should time admit, will be given as an appendix to the report. For the present we add the note which was made in passing up to the top of the hill. The first product met with is the gravel of the second alluvial. This is followed by the red earth, and which always forms the third or upper alluvial. Beyond these, in rising, is the drab coloured slaty rock, the first seen. The next resembles the usual envelope of the lower plaster. To this about 20 feet of layers, with small pores, succeeds, and then an interval from depth of soil for some distance takes place, and then again the rock masses which compose the upper part of the hill. The first is a marly shale. Then mixtures with more carbonate of lime, some compact, some crystalline, confused, aggregated, and presenting cavities lined with crystals of that mineral, and containing also sulphate of strontian in the mass and in the cavities. With these and above these, are other aggregates like serpentine, marble, &c. with purplish shale, or slate which are followed by a green and blackish trap-like rock, as to appearance, but too soft for that rock. After this, that is above it, is the mass which resembles the material which forms the arch of the lower beds of plaster, and this is covered by the upper porous or "vermicular rock."

Magnesian Deposit.

This deposit terminates the group. It appears to be a thick series of what is probably a magnesian limestone. Usual colour is of a brownish drab, and also dove, breaking with rather an earthy fracture. Its great characteristic, and which will suffice for the present report, is its fibrous cavities, caused by the crystallization of sulphate of magnesia, as we fully proved in the last report. These cavities are very numerous in the series, and in every locality where they are found show that they follow the gypseous masses. The most numerous are found at Hungerford's plaster quarry, and also by the rail-road just below Split rock quarry, near Syracuse. Likewise near the upper plaster quarries, on Cayuga lake, the mill at Troopsville, &c. &c.

The cavities in this series are more frequently found in a vertical position, like veins, than in an horizontal one, as is usually the case. The cause seems to be, the existence of imperceptible cracks, by which water has had access to the rock, and the salt has crystallized in accordance with the direction taken by this fluid. This opinion is confirmed by the facility which the rock breaks with more or less even surface in the vertical direction, and by toughness and unevenness in the horizontal one. The cavities strongly contrast with the rock, from thin lining of coal matter.

Salt Wells or Borings of Onondaga.

The borings and wells which have been made at Syracuse, Salina, Liverpool, Geddes, Montezuma, &c. prove that the brine or salt waters exist in all these places in geological materials, which serve as reservoirs; they were not the materials which contained or enveloped the saline particles or masses from whence the waters obtained the salts which they held in solution, and which give to them their briny character. These reservoirs are of two kinds. The one formed of the porous or loosely aggregated materials, which form the second deposit of the group, and the upper portions of the red shale. The other being excavations, once forming the deep bottoms of ancient valleys, now more or less and irregularly filled with alluvial materials. These two classes of reservoirs, in all probability, when not remote from each other, more or less communicate together. At present but one of the latter class is known, and now forms the bottom of Onondaga lake, but similar ones no doubt will be discovered, caused by the many large bodies of water which at a former period flowed from the south, but which now are concealed by alluvial materials.

If the opinion just given be true, we ought to find two distinct classes of borings, one referable to the rock layers which form the geology of the county, the other to no part of the saliferous group, nor of any rock mass of the Third District, but to its alluvial materials only. These borings also establish other important facts, to which we shall advert in their proper place. It is greatly to be regretted that no minutes of the borings were made and specimens saved, all the information collected being chiefly verbal, and obtained from Dr. Wright, the superintendent of the Salines.

At Liverpool, north of Salina, there are two borings, one immediately below the bank of red shale, upon which the town is built; the other some distance to the southwest, on the outside of the canal, and opposite to a depression which is in the direction of a supposed outlet to Oneida lake. This well is 81 feet deep, water good, if not as good as any on the salt reservation. Less water is drawn from this well than from the one at Salina. This well was bored through about 12 feet, principally of lake marl, below which was 14 feet of fine sand, followed by 43 feet of a very fine clay of a grayish colour, under which, to the bottom of the boring or well, as it is termed, was gravel with some sand.* The first boring, the one below the bank of red shale, was 274 feet deep. Its whole course was in the red shale mass. At 60 feet

* See Dr. Beck's Report.

there was fresh water, and below that point there was no salt water worthy of attention.

At Salina, there are three wells or borings, all which are in the marsh, situated like the well at Liverpool, of 81 feet deep. The principal well is 72 feet deep. It passes through muck and lake marl, indurated clay and pebbles, thin coating of gravel, sand and gravel. Its source is in gravel. This is the well which furnishes the greater part of the water used at the salt works. Its supply is most copious.

A well, beyond or nearer to the lake, gave 6 feet of muck, and from 5 to 6 feet of lake marl, which is the usual thickness of these two deposits; then marly clay, of about the consistence of soft butter, for 30 feet, black sand about 35 to 40 feet, clay and gravel 2 to 3 feet, coarse gravel, sand, &c. at the bottom, depth being 90 feet. The water of this well is strong, being 78 per cent even after being used for two or three days. The well at Syracuse is an old boring. Its depth is 160 feet. It passes through the usual muck and lake marl, then sand and gravel all the way. The water is what is called good. There is a natural defect in this well, which makes it less servicable than the other wells. By pumping, its water soon becomes weaker, showing a ready admission of the upper waters to the well or part from whence the water rises into the pump tree. The supply to this well is so copious that the well often overflows, yielding at the surface a water of from 20° to 25° in strength. This well is about midway between parallel lines of the Geddes and Salina wells, and it is said that salt water can be traced along its parallel upon the surface of the marsh for some distance, either by a white saline crust in dry weather, or by the samphire plant.

There are two wells at Geddes, and according to Dr. Beck, one is 124 feet deep, the other 176 feet. I could get no other information of the strata through which these borings are made, than that they consisted of alterations of green, blue and red shale. The "veins" of salt water, appearing in soft or porous layers.

From these borings it is evident, that two kinds of materials are met with. The one appertaining to the group of the Onondaga salines; the other to the alluvial. In the one we find no pebbles, stones and sand, whilst that of the other is composed of like materials.

The occurrence of brine in two distinct classes of materials, so wholly discordant, geologically, from each other, show at once a common source from whence the saline materials were derived. That these materials

were not derived from the alluvial is certain; that they were derived from the shales in which the borings were made, there is not one fact to prove.

The proof of saline waters, existing in alluvial materials, being established, and to the depth of 160 feet, as in the Syracuse well, we have now to show that such depressions did exist in this ancient area; for though the fact of the existence of alluvial at such depth is proof sufficient to those well acquainted with the subject, yet we know it is not to those to whom geology is yet a novelty. This proof exists, for we believe that there is no fact, to which a key is not to be found.

Lake Sodom.

This lake was examined by Dr. Wright, Dr. Beck, and myself. It is small, singular in all respects, and merits a better name. It is about one and a half miles east, of Manlius centre, and a few rods south of the canal, the waters of which are about five feet above those of the lake.

The lake is excavated in the second deposit, and in the red shale. Its sides and bottom are covered with lake marl. The trees that have fallen into it are whitened by it. The shore on all sides shelving to a depth of 20 feet at the distance of a few yards. The water is remarkably transparent, and of the greenish tint common to such waters. In proceeding up the outlet from the canal, which is narrow, and about a half a mile in length, you enter the main body of water, and by removing a short distance either side, so as to lose sight of the outlet, the lake then assumes the form of a circular pool as regular as if scooped by the hand of man. It has the appearance of having been caused by a whirlpool of great magnitude.

This lake was sounded in many places. The outlet gave from 25 to 80 feet of depth; and the pool, where the circle commenced, beginning near the outlet, gave from thence to the centre, from 104 to 168 feet in depth. The bottom was of blackish coloured marl, the lead sinking a foot or more into it. The water, near the bottom, we found to be highly charged with sulphuretted hydrogen, but contained no saline matter that was perceptible to the taste. There is another lake rather smaller which we did not visit which is connected with Sodom lake by a small outlet which is only visible when opposite to it. Sodom lake is 44 feet above the level of Onondaga lake. Its depth to the marl, at its bottom 168 feet; leaves 124 feet. What the thickness of marl is, cannot be conjectured; but this depth proves the existence of a deep depres-

sion below the surface of the area, and in the lower part of the saliferous group of Onondaga. When we consider that Sodom lake is wholly unconnected with any of the present or ancient water courses, we should expect a less erosive action than where a connection with such existed.

Onondaga lake is but the extension of the vally which lies south, and the Onondaga valley, like every valley north, is connected with a valley which lies south, and reciprocally every valley south has its northern valley, and whether you rise towards the point where the waters divide, either from the south or the north, you find that the sides of the valley lose but little of their elevation, thereby proving the existence of a more ancient valley, and anterior to the cause which formed the double plane which they present. This view is given to show that great and mighty changes, but simply wrought, have taken place upon the elevations of the Third District, which should lessen our surprise for changes of a like kind upon a depression; when a cause of erosion existed upon those heights; one of which outlets was by Onondaga lake.

Looking over the surface of Onondaga lake we find it encircled by a white margin, which when examined, shows that it is formed of lake marl, the part exposed to the air being in a state of aggregation, which gives it the appearance of tufa, but in gravel-like fragments. With the exception of the hills at Geddes, Salina and Liverpool, the margin of the lake lies very little below the general surface of the country.—These hills show by their composition that they are the remains of the ancient sides of the valley, being formed of the masses which belong to the saliferous group.

The proof being ample, of the existence of a deep excavation where Onondaga lake is seated, and the same excavation being filled, in part, with alluvial materials containing salt water, nothing more is required for a right understanding of this reservoir, than an impermeable covering to prevent the union of the salt water of the alluvial with the fresh water of the lake. The salt water often rising in its reservoir and flowing over its limits to the lake. This covering is the lake marl; it is co-extensive with the whole border of the lake, extending inwards until lost to the eye, but met with in every sounding that was made, only sullied by vegetable or argillaceous matter in the deeper parts of the lake. In all the borings for salt water this marl is constantly traversed, unless the boring is in the original mass or rock. Its thickness is about six feet, and highly adhesive or tenacious in its character. No material for insulation could be better, and seems to me to fully explain

the separation of the saline waters which it covers, from the waters of the lake, to which it forms the bottom of the basin.

In order to ascertain the depth of the lake, the kind of water which exists at the bottom of the lake, and the nature of the bottom, Dr. Beck and myself made an excursion thereon. We found that the greatest depth was opposite to Liverpool, about midway between the west shore and that place; it was 65 feet. The water obtained from that depth was just as fresh or pure as at the surface. We found that the water gradually deepened from both sides of the lake, less gradually, however, on the western shore than the east shore. To about fifteen feet from either shore we found the marl was white, but beyond it was of an ash colour, and also blackish blue, the lead sinking into it for many inches. Where the waters from Nine Mile creek enter the lake, as we supposed, the water deepened from 10 feet on both sides to 25 and 28 feet in the inlet.

The boring which was commenced in the summer at Salina, by authority of the Legislature, in the hope of obtaining rock salt, or a stronger brine than any yet discovered, is near its completion. It gives negative knowledge as to the object for which it was undertaken, but some valuable facts for the history of the salines of Onondaga. The facts are confirmatory of all that we have advanced. It was evident that rock salt could not be obtained where the boring was commenced, because it was at least 100 feet below the porous rocks and the position of the hopper cavities, the only position where salt, from observation, could be expected to exist. With respect to salt water, it was too near the line of the shore of the ancient excavation, to calculate that any great depth of alluvial could be obtained, and without which no greater strength of brine could be expected, unless the red shale deposit was in connection with the deepest alluvial, which the deep boring at Liverpool negatives.

At my last visit to Salina, the boring had attained 85 feet, 62 of which in small gravel with earth, large gravel with fragments of 2 or 3 inches diameter, more or less water worn, consisting of granite, hard gneiss, red and gray sandstone, black limestone and a piece or two of the porous rock. The last 8 feet was what is called hard-pan, being clay and stones cemented, under which

at 62 feet, red shale yielding at

72 " small veins of salt water from a porous rock.

76 " bluish shale, forming a tenacious clay, in which the boring continued to

85 " when I left Salina. Since then I have received eleven spe-

cimens of the borings from Judge Allen, the inspector of the salines, and also the following account of the continuation of the boring. On the 13th Nov. the Judge writes, "We have drilled 435 feet. Temperature now 55°, (water) very little brackish."

"At about 260 feet from the surface we struck a red rock much of the colour and hardness of red chalk, and it has continued the same until now."

"At 88 to 98 feet below the surface the red shale had a singular appearance. A German who called there, and professed to be a mineralogist, told the workmen it contained mercury."

"At about 150 feet from the surface there is some substance which produces a curious effect on the drill poles. When first drawn up they look as though dipped in butter-milk; when exposed to the air they become encrusted with a red scale. About 60 feet of the rods are encrusted in this way."

The 28th December the Judge again writes: "We are now 531 feet, with little variation since I wrote you; in short, since about 270 feet the same red rock continues, with the exception now and then of a foot or two of green shale."

The specimens received from Judge Allen, arranged in the order of their distance from the surface, are as follows:

G, from 88 to 98 feet. This is in colour a brown fawn, particles almost impalpable to the touch. It is not likely to contain mercury, for there is no ore of that metal which resembles it, and mercury is found in a less ancient position, being of the age of the coal formation.

A, about 100 feet from the surface; 7 feet thick, of a blue ash colour, and slightly effervesces with an acid.

K, from 129 to 278 feet; three varieties, all slightly effervesce, one earthy and of a gray pearl; another in fragments of a similar colour, but in layers; the third kind in fragments; but with a reddish colour.

D, 290 feet; layer 3 feet thick, in fragments of blue or green shale, compact and hard.

E, 297 feet; 30 feet thick, hard dark brown red shale, with some grains of quartz sand.

F, 356 feet; soft red shale, no fragments, all paste, and very adhesive; the last four days cut 8 feet in 24 hours.

H, 364 feet; red shale, fine in its powder, very adhesive.

J, 370 feet; red shale, very adhesive, adhering to the drill in the shape of a plug.

M, 446 feet; red shale, same as above, to appearance. The progress of boring in this shale was 5 feet in 24 hours. These red shales appear to contain very little brine; in some, no perceptible effervescence.

In the same letter, there is an account of the boring of another well, which is as follows: "We began a well in October, near the present well in Syracuse, being about the middle of the valley, and in the margin of the creek.

"The first 8 feet clay and marl; then gravel cemented slightly together, to about 97 feet; from that depth to 115 feet, mostly sand, mixed with the same kind of gravel, and from thence the gravel has been coarser, and but little sand to the present bottom, being 136 feet.

"The gravel is blue limestone, red sandstone, white sandstone, some small pieces of blue shale, very few red, granite and hornblende rock.

"The greater part of the gravel is blue and black limestone pebbles, of an inch or two in diameter, and larger pieces of gray limestone, from one pound to four and five.

"The water is now 60°; we expect to go about 20 feet more, say 160 feet, and hope to get water at 64°."

This boring shows that it is in the alluvial of the excavation, whilst the first or deep boring passes through the same alluvial, and extends towards the bottom of the red shale. Should the red shale be near its termination, then the rocks of the protean group will be reached before the 600 feet of boring will be attained; a fact of no small importance to those who have no faith in geological principles, confidence ending where sight cannot reach.

One boring yet remains to be noticed, that of Major Byington. It was at the top of the hill which rises in Salina, and extends south, passing Syracuse to the east. The boring was near to the Sink Hole, described by Dr. Beck, and not far also from the road where the porous rock may be seen. The boring, with its well, which latter was first dug,

were 370 feet deep. The first mass passed through was alluvial; this was 40 feet thick; then plaster rock 50 feet, after which the boring passed through alternations of greenish, bluish, and red shale layers; the order not remembered by the Major. The borings by drying in the sun, gave an efflorescence of salt, but the discontinuance of the work proved that it afforded no encouragement to a further prosecution. The hill where the boring was made is 220 feet above the lake, consequently leaving 150 feet of excavation below the lake.

With an observation or two, we shall terminate all that we wish to say in this report of the brine reservoirs of Onondaga. From all the borings which have been made in the rock, if we except those of Geddes, it does not appear that they afforded any workable or profitable quantity of brine, and I am disposed from that circumstance to believe that such would be the case with the wells at Geddes, were they insulated from the alluvial.

Finally; theory, or in other words, conclusions from facts, prove that the deeper the wells are sunk into the alluvial, all other circumstances being the same, the stronger the water. As the deepest alluvial must be where the excavation was deepest, this point or place must be first determined when stronger brine shall be needed.

The whole of our observations show that we are not to seek for salt or the source of the brine where we now find its waters, but to seek it where it had existence, and where it has been recognized by all who have seen the hopper cavities and know their origin. They may be considered to be too few for so great a source as we have presented to us at Onondaga, but it does not follow because we see comparatively so few, that there are not localities where they were and are more numerous. Were it otherwise, we should vainly look for rock salt, since no trace of its existence in the district has met the eye of any one. Moreover, we must not lose sight of the porous or "vermicular rock," which is far more abundant than the hopper cavities. I do not for a moment suppose that the pores were formed by the salt, for we are without proof of the kind. I adopt the received opinion that they are caused by gaseous or vaporous matter, but I can readily conceive that on the removal of the elastic force that gives rise to the pores, the salt, in obedience to a common law of crystallization, would take to the cavities from offering no resistance. Besides, we must not overlook the fact, that though the cavities of all kinds in any one locality be not great, the deposit which extends south, east and west, is to a great ex-

tent subject to the drainage of a reservoir, known by the well at Syracuse, to be over 160 feet deep, and extending north and south to distances not known.

In this report, I do not assert that rock salt has no existence within the district, for no proof is known that it does not, or proof that it does. It is very certain that the surface of the hill between Salina and Syracuse exhibits proofs innumerable of the removal of a soluble mineral; the species remains yet to be determined. I did not examine the cavity which Dr. Beck describes, having left it for another period.

There are but three abundant minerals which are soluble in water, carbonate of lime, gypsum and common salt. Each of them produce sink holes, in consequence of this property. It is not at all impossible, that salt in abundance may have been deposited near the sink holes, for such is the position of the hopper cavities and the porous rock, all which long since have been removed from the permeable nature of the gypseous hills. This is the hill which crosses the Fort-street road, where dubious rocks were observed, and which I have no doubt owe their nature to a high grade of thermal, if not an igneous temperature.

The fact of the difficulty of obtaining water in the gypseous hills, unless by sinking to the level of the water courses, show that there is little probability of finding salt above the level of the waters, from having long since been dissolved; but below the water levels no such objection can exist, if we except such portions as the drainage to the ancient excavations may have removed. The place, then, to bore for salt is below the level of the waters, in that portion of the third deposit which contains the hopper cavities and porous rocks, which from the dip of the whole group, must be sought south, and not north of Syracuse.

Montezuma Brine Springs.

In the present report, we shall say but little of this saline, so many of our pages having been given to Onondaga, from the desire to contribute our mite towards making known its true history.

From the report of Dr. Beck, it would appear that the three wells or borings were all in the alluvial; the first about 100 feet in depth, the second 80, the third 121 feet. This latter, the new well to which the section given by Mr. Conrad, in his report of this district, belongs. By the section, it appears to have been sunk in 77 feet of alluvial and 44 of the lower gypseous or second deposit of the group, salt water having

been found in connection with the whole of the strata. It was in the last five feet of the alluvial that a mass of granite of 500 pounds weight was discovered.

North of Montezuma, in the Cayuga marsh of Superior, now Howland's island, a boring was made in 1827 and '28, by Mr. Howland, for the purpose of finding brine, as salt had been manufactured in considerable quantity on the opposite side of the river, on lot 54, in Wayne county. The boring was about 20 rods from the upland, in the marsh or swamp. I am indebted to Mr. Howland for the detail.

First 5 feet muck; 6 feet marl, shells, white, pure; 4 feet clay, soft, blue, pure; 10 feet quicksand; 4 feet loose gravel; 11 feet sandstone, gray; 4 feet plaster, gray, mixed with white, some transparent; 20 feet dark stone, interspersed with white flint, sharp grit; 7 feet soft rock, interspersed with isinglass; 28 feet dark coloured stone, softer than the mass of 20 feet, but sharp grit; 25 feet blue, very soft rock, interspersed with white chalky substance, like salt or magnesia in appearance; 36 feet soft sandstone, red, or red rock interspersed with one-fourth white chalky substance; total depth was 167 feet.

There is no mention made of finding any salt water, but before reaching the 167 feet fresh water rose in the tube to the height of 3 feet above the level of the swamp.

The borings at Montezuma prove that for 80 feet, the brine is in the alluvial, which fact favors the existence of original alluvial excavations now appearing as swamps, marshes, and probably may even exist beneath the gravel hills of that section of the country.

The only person that I am aware of who has given an opinion of the saliferous group of Onondaga, which accords with the one I adopted, is Prof. Rafinesque. In his *Atlantic Journal*, vol. 1, p. 73, he places it amongst the salses, using the term which Spallanzani had applied "to the mud volcanoes of Italy which commonly threw out salt water at the same time." It is impossible, consistently with order, not to view the group as a whole; for though its parts are different, yet they are not separable without destroying a certain harmony or unity, which results from the union of its parts. Regarding it with the eye of a chemist, we find that its prominent characters have been derived from the law of substances separating in the inverse order of their solubility. That which is least soluble is the first to deposit; that which is *most* soluble, the last.

In the first or lowest deposit, the red shale, we have the red oxide of iron, the least soluble material which characterizes the group. In the second and third deposit, we have the gypsum, which is next in order as to difficulty of solution; between the two upper ranges of this substance, we find the common salt or its hopper cavities where obviously it should be; and lastly the sulphate of magnesia, the most soluble of the four products, appears only in the terminal deposit.

Those who wish to see a practical illustration of the order in which the characteristics of the group separate from each other, will find it on visiting the salt pans where evaporation is carried on by solar heat. There he will find that the first deposit is the red oxide of iron, the second the gypsum, the third the common salt in its form of hoppers, or reversed pyramids, composed of little cubes, and on enquiry he will learn that the magnesia salt remains in solution.

We would also recommend a visit to Mr. Green's salt pans at Salina, where the boiling of brine is carried on in close vessels. There will be seen many products as to form, which are occasionally met with in the New-York rocks, and to which I have ascribed a thermal origin, such as oolite varying from the finest to the largest as in pisolite; also concretions of other kinds, fragments formed of thin layers that have been broken up and cemented together like to those we find in portions of the lower layers of the "calciferous sandrock," and also in the concretionary limestone which forms the base of the saliferous group.

Water Lime.

The water lime group of Manlius, is the next series as to age; it rests upon the saliferous group, and in all cases where a regular denudation has taken place, it is only to be found south of the gypseous range, being the overlying mass. The group is exceedingly well characterized by its fossils, of which some are extremely numerous, and are found from the Hudson to Cayuga lake. With but one exception, the whole of the water lime which is burnt for cement in Madison, Onondaga and Cayuga, is from this group; and the greater part of the limestone which is converted into lime along the same range, is obtained from it.

With this group, all the drab or light yellowish coloured limestones so common, and which gives character to the group below it cease, and with it is the beginning of the usual kinds of blue, gray and black limestone, which exist so abundantly above, and whose range is so extensive east and west

The upper layers of the group are from 3 to 4 feet thick, sometimes subdivided into what are called courses. There are but two layers of water lime separated by bluish black limestone, which is generally disposed to separate into courses, whilst the layer of limestone which is above the upper water lime is broken up by lines of fracture, in all directions. This is the layer which is most commonly burnt for lime. In general, the upper layer of water lime requires less heat from being of a less dense nature than the lower layer.

From the eastern end of Madison county, extending east through the Third District, there is a series of limestone layers which are not found beyond that boundary to the west. These layers are characterized by the *Pentamerus knightii*, *Euomphalus profundus*, *Delthyris pachyoptera*, *D. macrupleura*, *Apiocrinites*, &c. &c. and have not been seen west of the falls of Oneida creek.

These layers are followed to the east by a series of argillaceous layers full of that singular marine plant, the *fucoides canda galli*.

The omission or absence of these two series to the west, causes the next series of layers to repose immediately upon the water lime group. This is the white sandstone noticed on the hill at the falls of Oriskany, and for the present may be called the Oriskany sandstone. This sandstone is well known to extend over many of the States, occupying, like all geological masses, a fixed position in the whole series, but is exceedingly variable as to thickness. According to the report of the State geologist of Pennsylvania, it is there 700 feet thick. At Oriskany falls, about 20 feet on the road from Elbridge to Skaneateles, it is over 30 feet. At the quarries near Auburn, it is from a few inches to about 2½ feet; and at Split-Rock, near Syracuse, it shows itself in some parts by a mere sprinkling of sand, observable on the bottom of the layer which covers it, and in other parts by a thickness of about six inches.

This sandstone is the rock of which the lock at Jordan, not Lyons, was constructed. It was quarried on the road from Skaneateles, which goes by the east side of the outlet towards Weedsport. The lower part of the sandstone abounds in fossil shells remarkable for their great size. Most of them, if not all, are found in the gray sparry crinoidal limestone, which rests immediately upon the sandstone, and so far as I have had time to attend to their examinations, seem to be confined to the two rocks.

About three-fourths of a mile to the northeast of Perryville, on the farm of Mr. Van Eps, from 100 to 200 tons of iron ore was quarried, but found too poor, or too hard to work. It consists of mixtures in very variable proportions of red oxide of iron, sand, coarse and fine, with other silicious matter. Some of the ore is oolitic, some almost compact and jaspery.

This iron and its sand is found immediately below two of the layers of limestone which forms the great terrace which extends through the three counties, and belongs in all probability to the period of those series which are wanting to the west. This is the last appearance of the red oxide of iron in the district, unless it should be discovered in the red sandstone and red shale of Otsego, which occur high in the upper series, approaching to those which are near to the age of the coal.

Gray sparry crinoidal limestone. This rock in Madison, Onondaga and Cayuga, rests upon the Oriskany sandstone, or in its absence, upon the water lime group. It is the limestone so extensively wrought near Syracuse, at Split-Rock and the quarries to the west, which adjoin to it, and of those to the east near the village of South Onondaga. It is the limestone which is worked at the prison at Auburn, back of the village of Chittenango also, and other localities of the three counties. This limestone extends throughout the Third District, with but few interruptions. It is readily known by its gray colour, its crystalline fracture, its numerous organic remains, so different as a group from those of the rock above, and those below; for though it contains many of the fossils which belong to the sandstone, it contains a considerable number which are its own.

The bottom layer of the limestone contains rolled stones at its lower part, more flat than globular. Some of the stones are like the hard sandstone found with the iron ore near Perryville; others compact, hard, of a dark chocolate colour, and containing some small cavities which, from the lamellar structure, appear to be filled with anhydrous gypsum.

The gray limestone is the rock of which the mason work of the enlarged Erie canal is to be constructed; and for toughness and durability as regards the action of atmospheric agents, it has not its equal in the district. Its only defect that I am aware of, is one not of grain, but of division on the large scale, caused by its association with a greenish, shaly matter, which was not equally deposited as to quantity, nor

equally distributed, but deposited upon parallel surfaces, or what is more likely, separated so to form such surfaces, dividing the whole mass into layers without courses, and layers with courses of different thickness in different quarries, and in different parts of the same quarry. A selection, therefore, becomes necessary, for a block cut from a layer with courses, requires to be handled with care to prevent a separation of its parts, and if exposed to water and frost, the like result must sooner or later take place. It is obvious that such stones cannot be used to advantage where a durable structure is to be made, unless placed below the point where air and congelation have access; and none but single or unit masses ought to be used above that point, and of the greatest dimensions; weight being of far more importance in our climate towards making permanent works, than the best cement yet discovered.

This limestone is but a thin mass of from 8 to 12 feet in thickness.

Above the gray limestone there is a series of shelly rotten layers of impure limestone, probably caused by an increase of the shaly matter of the gray limestone, changing all the characters, chemical, mineral and fossil which belong to that rock. The total thickness of the layers is from 9 to 12 feet.

These layers in their turn are followed by another small series, consisting of limestone, usually black, compact and rather brittle, generally terminated by one or two layers, containing nodules of flint, the flint arranged in parallels. In some quarries there are no less than ten layers or ranges of flint. With a change in composition, there is a change in the fossils likewise, which is common to all the New-York rocks, and to rocks elsewhere; a change of material denoting a change of circumstances, which whilst they favor the increase of certain classes and species of organic beings, may be injurious to others. The layers below the flint, which I understand is the true "cornitiferous rock," of Prof. Eaton, and are extensively worked at the different quarries to the north of Auburn, where the whole series may be seen from the upper part of the water lime group, to the layers which contain the flint. The whole disposed in two or more terraces which extend east and curve west and south towards Springport. The thickness of the last series from 15 to 20 feet.

Seneca Limestone. This rests upon the layers of "cornitiferous," as may be seen at the falls of Oneida creek. This is the last connected series of the great limestone range; all the limestones which are found above the Seneca limestone, with the exception of the Tully limestone,

occur in short, interrupted layers that are local, being subordinates of the slaty shale rocks which commence from the Seneca limestone. This limestone I did not see at Auburn; the alluvial and village covering the space between the corniferous and the black slaty shale or "pyritiferous slate."

The Seneca limestone, I first met with in Seneca county; it is there separate from all other masses of limestone, and could be confounded with no other; hence its name.

This limestone contains but few species of fossil shells, one of which I have only seen in this rock. Another, the *Strophomena lineata*, I do not remember to have met with in any rocks below, and is highly characteristic of this limestone; for though it is found in the shales, which are several hundred feet above it, yet it rarely occurs in any of the limestones; and in some localities of the Seneca, the individuals are so numerous as to present almost as much shell as stone.

We have now, in this report, and in the one of last year, noticed in brief, the whole of the groups and rock masses, great and small, which occur geologically between the gneiss of Little-Falls and the upper layers of the great east and west limestone range of New-York, and in the order in which they follow or rest upon each other—the order of their age. The thickness of the whole, taking the measure of each rock and group where its thickness is greatest, exceeds 2,000 feet. All the different groups, containing organic remains, are readily identified by them, causing no difficulty to those acquainted with the fossils in assigning each group, rock or specimen containing them, to the place which it holds in the series.

Of the rocks to be noticed, there remains from 12 to 1500 feet before completing the whole of the series of the Third District. All which are anterior in origin to the coal. We had intended to have given the different groups into which this great mass is divided, from observations made with Mr. Hall, along the line of Cayuga lake to Pennsylvania: but the length to which this report extends, leaves but a few pages for the products which belong to the northern section of the counties, and therefore must be left for the subsequent one.

The Seneca limestone, in many of its localities, is of so dark a colour from carbonaceous matter as to be almost black, which is the case with the mass below it, but not in so great a degree. So great is the quantity of carbonaceous or coaly matter which colours the slaty shale, or the "pyritiferous slate" which rests upon the Seneca limestone, that it

often exhibits itself as coal, giving rise to an expectation of discovering beds of workable or profitable coal, where such perceptible accumulations exist. A number of localities where excavations for coal had been made in this rock to the east of Oneida creek, were given in the last report, and a number of like excavations are to be seen in the same rock, to the west of that creek.

In many places carbonate of lime has been deposited with the material of the slaty shale, but not in sufficient quantity, excepting in one instance, to form a layer or two which extends for some miles. It generally forms those kind of interrupted beds which may be termed concretions, though they are of considerable length as to thickness. It also appears as septaria, but without divisions, or septa; and again, as perfect septaria, as at Auburn, in the outlet of Owasco lake.

Above the falls, on Oneida creek, just below the saw mill, two excavations were made for coal; one by a company, the other by Elias Mason; small pieces were obtained, but nothing which could give the least encouragement to those acquainted with the rock.

A boring of 100 feet for coal was made in the same rock, by Mr. Sage, near the road which goes from Chittenango to Cazenovia: And two excavations were made for the same object near Manlius square; one on the farm of Mr. Nettleton, near the turnpike, about a mile west of the village; the other a little further west, on Mr. Marsh's farm. The excavation made by Mr. Nettleton, is by the side of a brook, and in the black slate which is much contorted, owing to crystalline limestone which is mixed with it. Both are very black from coaly matter, of which minute veins are to be seen. At the place where coal was sought for, there is a fault, the first I met with going west. The waters of the brook flow over layers of limestone, which belong to groups below the slate worked for coal; the two rocks now appearing as parallel masses, and not as they were originally formed. A similar fault likewise occurs at Marcellus, where the slate is deeply coloured with coaly matter, and contains minute plants and fragments of the same. The cause of the fault is very obvious, at Marcellus; for the existence of sinkholes and the abundance of water from springs in the Nine Mile creek below, show subterranean passages or excavations by which portions or blocks of upper masses have been let down to a lower level. The same effect exists in the quarries south of Springport on Cayuga lake, where several extensive masses of two distinct eras may be seen, now nearly on the same level, having, no doubt had their

foundations removed by springs or waters passing under them, similar to those of the village.

Tully Limestone.

After rising and entering upon the slaty shale and sandstone which cover the whole of Western New-York, to the south and east and west of the great range of limestone of which the Seneca is the upper part, we find but one extensive regular deposit of limestone, which from the town of Fabius, extends west beyond Seneca lake. The geographical distribution of this limestone gives to it a somewhat anomalous character, for it forms two ranges, owing to an enormous curvature or swell which this rock and its associates present, causing it, after it has dipped below the surface of Cayuga lake near the line of Tompkins county, to again appear and to rise nearly to the height of 100 feet above the lake, and finally disappear near Bloom's lime kiln, about five miles north of Ithaca. This is the Tully limestone, a mass from 12 to 16 feet thick, of a bluish and brownish colour, not remarkable for purity; making, as is said, a good, but not a white lime. It is met with at Tully Corners, at Borodino, on both sides of Skaneateles lake, on the road from Owasco to Kellogsville, at Martville, and the falls of Dry creek, below Moravia, and in the ravines along Cayuga lake, from four to five miles south of Aurora to Bloom's lime kiln.

Large angular masses of this limestone have been carried as far as eight miles south of Ithaca, or twelve miles from their original location. There is a mass at that distance on the farm of Mr. Hollister, which from its size was considered to be in its original place. It is quarried and burnt for lime. Other masses, but not so large, but sufficient for filling three kilns have been found five miles south of Ithaca, on the farm of Mr. Ludlow, and in other parts to the south, east and west of the same village.

The Tully limestone is the last mass of limestone that has been discovered south; all the carbonate of lime which occurs above it, is much intermixed with shale or sandstone, and with carbonates of iron and manganese; these two minerals seem to increase as the age of the rock diminishes. It is their presence that destroy, in all probability, the whiteness of the lime made from the Tully limestone, as minute veins of carbonate of iron are often seen in the stone.

Tufa and Lake Marl.

These two products are the same in composition, differing merely as to cohesion. One being formed under circumstances which admitted of

cohesion or aggregation of its particles, the other being deposited in water like a precipitate, that fluid preventing adhesion.

Calcareous tufa abounds throughout the whole of the gypseous hills, the earthy limestones which they contain highly favoring the solvent powers of the water which percolates the hills. So also the great calcareous range contributes its portion, and the ancient alluvions likewise, some of which are highly calcareous, and have been carried south for a great distance, and affording a copious supply of the same mineral. The great abundance of calcareous waters in a zone or belt of about twenty or thirty miles wide, in the Third District, must exert no small influence upon vegetation, tending to give a kind of perpetuity to wheat, which, when such waters do not exist, that grain soon ceases to repay its cultivator, unless art makes up the deficiency.

An immense deposit of tufa covers the side of the hill and the road going from Tully Corners to Syracuse, on the west side of the Onondaga valley. It must be of great thickness, for neither the road which is cut into it, nor two ravines which are excavated in the tufa, reach the bottom. Lower down the same valley, at about fourteen miles south of Syracuse, there is another deposit, but of limited extent in comparison with the former one. It projects from the hill to the right on the land of Joseph Ackels.

There is a great deposit of tufa by the side of the rail-road which goes to Split-Rock quarry. It covers the side of the gypseous hill like a shield, the layers curving with the irregularity of the surface upon which it was deposited, and often discoloured or black by vegetable matter.

Chittenango has been celebrated for its petrified wood, or rotten wood replaced by calcareous tufa, which latter is very abundant, and covers the lower part of the hill-side just below the rail-road commenced by the late J. B. Yates. Very little of the petrified tree now remains; what is now to be seen resembles the thin irregular layers which are not uncommon to tufa. Other masses, without any defined structure, strew the side of the hill, a constant increase taking place, from the water which oozes out of the hill.

The space to the south side of Canastota, near to the village, comprising the low ground between the hills to the south and the rise to the canal, seems to be covered entirely by lake marl and tufa.

The depression in which occur the mineral springs of Messina, three miles east by north of Salina, is underlaid by tufa. It is well here to mention, that since Dr. Beck visited the springs a more copious one has been discovered, yielding, according to its proprietor, ten times more water than the former one.

Tufa is extremely abundant between Camillus and Canton, and between Canton and Elbridge.

One mile south of Peru, at the foot of the hill in the road, it occurs in great abundance. It is the gravelly kind.

On Limestone creek, about three-fourths of a mile north of the Fabius and De Ruyter road, is a fine deposit of tufa, in the state of earth, and in porous masses, the horsebone limestone. The earthy part is made into bricks and burnt for lime. No lime can be whiter or purer than this is, and from what I could acquire, the lime is highly valued. The owner of the lime kiln informed me, that one bushel of *brick-lime* requires four bushels sand; one bushel of lime from the porous mass requires three bushels sand, whilst one bushel stone lime only requires two of sand. The deposite on Limestone creek extends up the hill for about 100 feet, and extends several hundred feet horizontally; thickness not known.

These are some of the prominent localities of tufa, whose value can not be appreciated in a region where limestone is so abundant, and where the natural soil amply enriches the cultivator, without the aid of art.

Lake Marl.

If the quantity of tufa be great, that of lake marl is prodigiously so, being found in nearly all the swamps, marshes, ponds and lakes which exist along the course of Seneca river and the Erie canal, extending from Cayuga marshes to Oneida creek. We mentioned that the whole of the bottom of Lake Onondaga was covered with marl, which extends along the head and foot of the lake to distances not ascertained, with a thickness of six feet.

The Cowassalon swamp presents the greatest accumulation of marl in the three counties. This swamp contains about 10,000 acres, 8,600 of which are land, and 1,400 are covered with water. Less water exists in this swamp than formerly, being connected directly with Oneida lake by a ditch of 14 feet deep, which was made at the expense of the state.

It is said that when the waters first flowed off by the opening of the ditch, it carried with them the muck which covered the marl, leaving a snow white surface of marl, co-extensive with the whole area which was drained. Imperfect attempts have been made with poles to ascertain the thickness of the marl, but without effect, no bottom could be reached. The ponds or marshes west of the swamp, called the Green ponds, have also bottoms of marl; so likewise has the Vlie or natural meadow to the south of the swamp.

The great swamp of Onondaga is the prolongation of the Cowassalon, and like it, is of marl also. Innumerable are the minor localities met with in going along the Erie canal towards the west boundary of the District.

Lake marl is likewise found in many places upon the great elevation, In the lake-like depression north of Peterboro', after crossing over a low stony ridge on the road to Perryville, the road traverses a level swampy bottom, the ditches for drainage being dug in lake marl. The lakes to the southwest of Tully corners are all marl lakes; so likewise are the ponds above Hamilton village, which serve as feeders to the Chenango canal, and likewise other small ponds in the south part of Onondaga and Madison counties.

Tufaceous Iron.

On the land of Robert Riddle, one mile west from Chittenango, I was informed that there was a deposit of iron, portions of which had been carried over Oneida lake, but the owner of the ore received no encouragement from the owner of the furnace. I found it to be a calcareous tufa, stained with hydrate of iron, and noticed that the spring whose water deposited the tufa, gave no signs of iron, but that the ore came from the sluggish water of the boggy soil above the tufa. In some of the masses of ferruginous tufa there was a coating of oxide of manganese.

The same kind of tufa, stained with oxide of iron, is found on the land of William Wheeler, about two and a half miles northeast of Salina. For a few hundred yards on a slope to a swamp north, there is a deposit of tufa, the upper part of which is in some places deeply stained with oxide of iron. As the deposition of the tufa is constantly going on, the soil, which is composed of muck chiefly, rises. It is from the soil that the iron is derived, as mentioned in the first report of the Fourth District. That the iron is furnished from the soil, is evident from the fact, that the lower part of the tufa is not stained with

iron, and that a spring which formerly deposited iron, when its waters were in connection with those which flowed from the soil, now deposits none, its waters being separated from those derived from the soil. It is rare to find tufa, or lake marl, not covered with black vegetable matter, or muck, and there are many similar deposits of this kind of ore in the Third District, north of the gypseous hills.

This ore is not in sufficient quantity to be an object of utility, especially as all the red oxide of the district, the only abundant ore, is too calcareous for a like mixture; but were the argillaceous ores abundant, the tufaceous ore then would be of value, furnishing not only a flux but metal also.

Another locality of the tufaceous ore is on Nine Mile creek, between Marcellus and the great *embankment of the Syracuse and Auburn* railroad.

Clays abound in the Third District, usually in low situations, being the deposit of tranquil waters, whilst sand, gravel and other products of alluvions are thrown into hills and ridges.

The clays are either of a lead or of a yellow colour, well suited for bricks and the coarser kinds of pottery, though there are some, if not too calcareous, which may answer for finer kinds. Either there is but little iron in the clays of the Third District, or the quantity of carbonaceous matter destroys the red colour of the iron, the bricks in general being of a light, and not of a full red colour. Clays are exceedingly abundant in the low grounds north of the Erie canal, and in the southern parts of Cayuga, Onondaga and Madison.

Alluvions.

Besides the clay deposits of the low grounds, &c. there are three other depositions of alluvion as to age and composition. They are but seen in the hills, and to more advantage in the village of Chittenango than elsewhere. The lowest ~~mass~~ is a light coloured sand, in parts indurated, and in layers, with a slight inclination to the north, as though the sand had been thrown up from that direction. The upper surface has been furrowed before the deposition of the next mass, which consists of rolled stones, black sand, &c. The stones are gray and red sandstone, limestone and pebbles of primary rock, none of them present the flat disk-like form common to the stones of the shores of Lake Erie and Ontario, and from that fact it would seem that the waters which caused their form, were different from those of a lake beach, or

that the duration of action was not so great. In one place the layers of this second deposit have been arranged under peculiar circumstances. The sand which forms its base has been worn so as to present an angular elevation, upon which or against, the pebbles and sand of the second mass, to a certain height, are arranged in layers parallel to the two sides, but above that height, though the pebbles of the upper part continue to be parallel to one of the sides, it is an angle with the other side. A fact of some importance in practical geology, where rocks of the same composition are not parallel to each other.

The upper surface of the second mass was likewise furrowed, or made uneven before the deposition of the upper or third alluvion. This contains the red earth from the destruction of the red shale, with rolled stones, great and small, and often to be observed from ten to twenty miles south of where we now find it in situ.

Minerals.

Besides those which have been mentioned in the body of this report, there are few others to be found, and those only in small quantities.—Fluate of lime, in the gray sparry limestone, at the quarry of the New-York company at Auburn.

The same mineral was likewise found in the water lime series just below the above limestone, on the road from Cayuga bridge to Auburn. Sulphuret of lead from near Hamilton village.

Sulphate of strontian, in the septaria of the black shaly slate above the Seneca limestone, and in a similar slate above the Tully limestone, from many localities.

Petroleum.—This Mr. Hall and myself saw in the septaria above the Tully limestone, near Ogden's ferry on Cayuga lake. It was accompanied, likewise, by a liquid substance of the colour of phosphate of iron, or Prussian blue, and by another substance like spermaceti before the oil is fully pressed out of it. It was composed of fine scales, had a yellowish white colour, was in small irregular masses, with the appearance of having been melted. Both of these two last substances are new.

Serpentine of Syracuse.

The green and trap like rocks observed near the top of the hill to the east of Syracuse, have been examined so far as time would admit.—They are all serpentines, more or less impure, and of various shades, of bottle green, black, gray, &c. They all produce sulphate of magnesia

by oil of vitriol. These serpentines are at least new varieties for our country. Some have a peculiar appearance, like bronze, owing to small gold-like particles, with a lamellar structure, resembling bronzite or diallage metalloide. Also, other particles highly translucent, like precious serpentine, with frequently small nuclei resembling devitrifications or porcelanites, coloured white, yellow, blood red, variegated, &c. The grain of this kind is like common serpentine. In other kinds, the mass seems to be made of small globuliform concretions, varying in size, being centres of aggregation; some are of dark vitreous and serpentine, others of the compact kind, the enveloping part of a light colour. The first impression of this rock is like some of the New-Jersey trap-rocks, where amphibole is in imperfect crystals, or like a pyroxenic lava, with its imperfect crystals imbedded in the more compact material.

These two principal varieties produce endless mixtures upon the small scale, to say nothing of those derived from difference of shades of colour, the presence of veins and mixtures with the associated shales.

These serpentines seem to resemble the ophiolites of Tuscany and Florence, and should the views of Brocchi be correct, they may not only be similar in origin but in age. The objections which Mr. Brongniart makes to the very modern characters which their associates present, are all in perfect accordance with those of the New-York rocks, and no one acquainted with the facts which the survey has made known, at all doubts that those rocks belong to the period, or age, intermediate to the crystalline or primary rocks, and the coal of Pennsylvania; in other words, to the transition class.

Of the specimens collected during the survey of 1838, there are sixteen boxes in the rooms of the Third and Fourth Districts, at the State House.

I had intended to have given a list of the fossils which have been found in each rock and group, but circumstances render it proper to defer the same to the next report.

Since concluding my report I have again had the pleasure of hearing from Judge Allen, giving the progress made in boring since the 28th December. At that period the depth was 531 feet, and in red shale. Since then the boring has attained to the depth of 550 feet, being an advance of 19 feet. Within the depth of 536 feet it was thought that about one foot of light coloured sandstone, very hard, had been drilled, and followed at 536 feet by what was called blue limestone. The Judge writes, "It probably is that. It is very hard; we bore only about 18

inches in 24 hours. The rods are indigo blue when drawn up; after standing some time they turn brown, or colour of iron rust."

"We are now 550, and in the same blue or black limestone. When we struck limestone, water from the bottom of the well was, say 50°, and is about the same now, not more; the water, which runs away quickly from the surface, at the mouth of the well, is 20°. My own opinion is, there is no salt water in the shaft, except what descends from the gravel beds above, and through the fissures and seams in the rocks, and they are frequent, and occur in the present lime strata."

This information makes it certain that the red shale mass has been penetrated, first meeting with a thin sandstone bed, and then finally the dark blue shales and the black limestone of the protean group. In every locality east, where the connecting rocks can be seen, the limestone is followed and preceded by blue shale. This fact is evident in the ravine back of Dr. Noyes' house, near the college in Clinton, also on the road from Clinton to Waterville at Hart's mill, and on the creek by Rogers' machine factory, which empties into the Sauquoit. The "iron rust" of the borings in the limestone can be seen in many of its localities. At the quarry back of what is called Turkey-street on the Skanandea, also in the road to the northwest of Skanandea village, and in most of the quarries of Onondaga and Cayuga, where the concretionary rock exists, for in altering by exposure to the air, it seems to contain iron and manganese, which is the cause of its brown rust.

Between the blue shale above the limestone, there is a bed of green shale; this may have run out at Salina, or have been replaced by the sandstone met. with, or not noticed; as Judge Allen observed in his letter, that at the depth of near 600 feet there is great difficulty in determining changes, unless well marked difference of character existed, and for obvious reasons.

LARDNER VANUXEM, *State Geologist.*

THIRD ANNUAL REPORT

Of the fourth Geological District of the State of New-York, by James Hall.

To His Excellency WILLIAM H. SEWARD,
Governor of the State of New-York.

SIR:—

Conformably with a commission received under the law authorizing a Geological Survey of the State, I have the honor to submit the following report of the progress of the survey in the district assigned me.

During the past season, the examinations in the Fourth Geological District have been principally directed to the counties of Seneca, Ontario, Yates, Tompkins and Chemung. Some cursory observations were made in the county of Steuben; and a re-examination of some parts of Wayne, with a view to ascertain the true position and extent of the iron ore, as well as to determine whether it be confined to a single bed or stratum, as heretofore supposed. The iron ore of Wayne county is of more economical importance than any other object, the gypsum excepted, in this part of the State; and I considered it necessary to devote some time to this subject.

Examinations in that part of the Fourth District which embraces the southern range of counties, can be profitably pursued only during a short period of the summer months. It becomes necessary therefore to divide our labors between these and the more northern and cultivated counties, instead of exploring throughout its whole extent each individual group or series of rocks. This would certainly be preferable, since the rocks are of variable character, and some essentially change or entirely disappear farther west; and from the limited portion examined, we are prepared to find very great differences in the fossil contents of groups at distant points. Such a course however could not be obviated,

unless more time were allowed for explorations in the unsettled portions of this district.

In company with my colleague, Mr. Vanuxem, I passed several weeks in examinations along the boundary line between the Third and Fourth Districts. The admirable facilities afforded by the banks of Cayuga lake, the valleys south and the ravines north, have enabled us satisfactorily to determine the succession and character of the rocks from Lake Ontario to the Pennsylvania line. Hereafter we shall be enabled to avoid collision and discrepancy in our descriptions, and to designate groups without confounding them with each other. We have also found the solution of many difficulties, in part arising from previous partial examinations, and also from the fact that the character of several rocks below the Onondaga limestone entirely or materially change in their eastern prolongation; and more especially after passing the longitude of Cayuga lake.

In Wayne county, on either side of the outlets of Cayuga and Seneca lakes, the rocks are frequently covered with high alluvial hills, thus almost precluding accurate examination; and in some of the softer rocks, which have been worn down by the same alluvial action, the concealment is so complete as to leave us in entire ignorance of the underlying strata. In the neighborhood of the Canandaigua outlet the country is covered in the same manner; and the rocks are visible only where streams of recent origin have found a passage. Thus the examination of such regions is rendered laborious, and accuracy can be attained only by minute and multiplied observations, by continued investigation and an extended knowledge of different localities.

With regard to the arrangement and succession of rocks presented in the section accompanying the report of last year, I have no important alterations to suggest. The names applied to the rocks were nearly all those which had before been used, or such as were merely descriptive, and intended to remain only till further research and concert of action should establish a nomenclature. This to some extent has already been done; and thus far we will point out the changes to be made, and the names to be permanently applied.

Every one who has studied rocks even partially, is aware of the insufficiency of mineral or lithological characters for giving nomenclature, and the many errors into which he may be led, whether in his own researches or by the mistakes of others. So likewise in the present state of our knowledge, we are unable in all cases to give names from fossil

characters; for though without doubt every group embraces its peculiar fossils, yet in all localities these may not be so marked as to excite attention, and in some may possibly be absent. It thus becomes a desideratum to distinguish rocks by names which cannot be traduced, and which, when the attendant circumstances are fully understood, will never prove fallacious. The basis of this nomenclature is derived from localities; and the rock or group will receive its name from the place where it is best developed. For example, the rock denominated in the section calcareous shale, simply to distinguish it from the green argillaceous shales below, will be called Rochester shale. In lithological characters it is extremely like one far higher in the series, but the fossil contents are entirely different. This contains the *Asaphus caudatus*, *Trimerus delphinocephalus*, *Platynotus Boltoni*, besides species of *Orthis* and *Delthyris*, all peculiar to this rock, and the characters if studied and well understood at Rochester, will guide the observer in all subsequent examinations. The limestone at Lockport excavated for the passage of the canal, we propose to call Lockport limestone. At this place the rock possesses in an eminent degree the geodiferous character, which has hitherto given it its name; but this is quite inapplicable to the same rock where seen in Wayne county. Yet it is believed that if thoroughly examined in all its varieties at Lockport, it will not be mistaken even in its eastern prolongation where it becomes a dark, nearly black, compact limestone. At some intermediate points, as Rochester, the rock exhibits an intermediate character, and at such places it can be advantageously studied. The rocks just named, together with the green shale and iron ore, the upper member of the series being the Lockport limestone, belong to a group very appropriately termed by Mr. Vaunxem, Protean. To this belongs a rock which has been designated by its contained fossils. Associated with the green shale and iron ore is a mass of limestone characterized, as Mr. Conrad observes, by broken shells of *Pentamera*, which abound in this rock and are found in none other in the district.

It may be objected to the proposed nomenclature, that in order to become familiar with the rocks, they must be examined at the designated localities. It is true that this system requires more labor than the study of a few cabinet specimens; which we are sometimes told is sufficient to prove, at sight, every rock on the globe. But thus we shall be enabled to avoid the egregious errors which have led to such false impressions regarding the identity of rocks; and if this system be established, and means taken to ascertain the character of strata, the community may be saved the useless expenditure of many thousands in search-

ing for mineral wealth in rocks where it does not exist. As for example, in digging for coal among the black shales of the Hudson river, and Western New-York, neither of which contain it; though externally they resemble the black shale of the coal measures. Numerous similar instances might be mentioned, where dependance on lithological characters has been attended with vexation and loss; while public confidence in scientific researches, which thus appear to have no sure basis, is gradually diminished.

The course of the rocks, as mentioned in a previous report, varies little from an east and west direction; each being limited on the south by the next successive and overlying member of the series; so that in going south we are constantly ascending in the chronological order, and in going north, every rock is an older one than the preceding. East or west the same rock may be found extending throughout the district. No important disturbances, arising from subterranean action, have yet been found to exist within the fourth geological district; those known are confined to a few undulations or slight downheaves, affecting only a small extent of country, and producing no perceptible change in character or outline.

I have made some attempts to procure topographical maps of the counties examined; but the present county maps are so inaccurate that little advantage can result from any constructed on these as a basis. They cannot be expected to give objects their true location within a mile or two, and can only present the prominent features of a country. Under these circumstances, I have thought it advisable to postpone the subject. A topographical survey of the whole State is a very desirable object and much needed, and to accomplish it in a proper manner, requires much expenditure of time with the necessary instruments to ensure accuracy.

Confined as the annual reports are to facts of utility, the rocks are described under the head of each county, with their localities, changes of character, and other important facts; and where the same rock occurs in more counties than one, reference may be made in the second to the previous description. Thus repetition will be avoided, and easy reference to particular localities secured.

SENECA COUNTY.

“Saliferous group of Onondaga.” All that part of the county north of the Seneca lake outlet, with the exception of a small portion south of a line drawn from Waterloo in a northwest direction to Ontario

county, is occupied by the "saliferous group of Onondaga." Nearly all this northern part of the county is deeply covered with alluvium; and the rocks appear at very few points. One of these is in the bank of Bear creek, where gypsum was quarried many years since, and another about three miles north of Seneca falls, where gypsum and gypseous marl were penetrated in digging a well.

The great depth at which gypsum is found in the north part of the county will, for the present, and for a long time to come, preclude its profitable exploration. The waters of Seneca lake, which have worn a recent outlet along the southern limit of this series, expose the gypsum and associated rocks near Seneca falls village, and for nearly three miles below. Along this distance the gypsum is extensively quarried. It occurs in irregular, often conical masses, enclosed in a grayish friable marl, with which it is often much intermixed, and in consequence deteriorated in quality.

There is here no evidence that the masses of gypsum have forced up the strata, as noticed in some places in Monroe and Ontario counties. On the other hand the lines of stratification in the marl are continued through the mass of gypsum without interruption. The strata are undulated; the depressions being between the beds of gypsum; and this appearance may have been caused either from the porous nature of the marl by which some of it has been dissolved and carried off, or from contraction, on drying of the mass between the gypsum beds. The latter being a chemical compound, and the force of aggregation greater, on becoming indurated, has contracted less than the surrounding marl; it consequently presents a slight convexity in the surface. In these beds all appearances prove that the gypsum was separated from the marl by chemical attraction, while each was in a fluid or semifluid state. Small particles and seams of gypsum still remain scattered through the surrounding mass, and it very appropriately receives the name of gypseous marl.

The rocks belonging to this formation, were described in the report of last year; they all bear much uniformity in character at different points, and are easily recognized even when the gypsum is not present, by their argillaceous nature, and nearly uniform drab or ash colour on exposure to weather. Some portions are harder and darker; frequently green on first exposure. Owing to the usually soft nature of the strata, they have been removed from extensive tracts, and the space filled with alluvium from more northern rocks; this is particularly the case in Wayne, and

the greater part of Monroe counties, as well as in Seneca and Ontario; and from this fact, a principal member of the series, the red shale, has been overlooked. But after knowing the character of this rock, from examining other localities, we find evidence of its existence along the northern part of this formation from the colour of the soil; but after much careful examination, I have not found a point between the Cayuga lake and Genesee river, where that rock is exposed. Near King's corners, in the town of Butler, Wayne county, the soil for some distance along the road is of a deep red colour, owing to the proximity of the red shale: farther west the line of this rock is covered by deep alluvium; in many places coloured by the red shale.

The quarries before mentioned, below Seneca falls, are extensively wrought, and large quantities of the plaster sent westward on the Erie canal, and southward up the Seneca lake, and thence by the Chemung canal; thus distributed over the counties of Chemung and Steuben. I have not been able, accurately, to ascertain the quantity of plaster annually taken from these beds, but believe it to be 5,000 or 6,000 tons. A small proportion only of the vast quantity has been removed, and at the present rate of consumption, it will be long before these beds are exhausted.

That portion of the county south of the outlet and north of the turnpike leading to Cayuga bridge, is probably underlaid by plaster, and the working of the beds on that side of the outlet will gradually lead to its development.

Above the gypsum, at this place, is a compact marl, containing small masses of granular gypsum or selenite, which often appear to have crystallized in the fissures and seams; these being generally separated, and the marl held together by the crystallized mass of plaster. The action of crystallization in this case appears to have taken place after the rock had become partially indurated; and the indurated part of the marl in many places is filled with irregular cavities, lined with crystalline carbonate of lime. This appearance may have occurred from the rock, having been broken up after partial induration, and have formed with the gypsum, then in solution, a kind of conglomerate, as is seen in some rocks below this.

The soft gypseous marl, surrounding the beds of gypsum, could be very advantageously employed on the sandy soils north of Seneca falls, and west, towards Waterloo. The argillaceous matter of the marl would form with the sand a soil of proper consistence; while the calca-

reous matter, and the small admixture of plaster, thus introduced, would be efficient in promoting vegetation.

The water lime series is the upper member of the "Onondaga saliferous group;" but at Seneca falls, the essential characters of this formation are not developed. The soft marl is succeeded by a grayish blue limestone, very compact and brittle, breaking with a conchoidal fracture, and exhibiting numerous crystalline points. The rock in place is fissured into irregular masses by seams which traverse it in all directions. It possesses neither the colour nor mineral composition of the water lime. Throughout the whole series it is extremely variable; and though in many places possessing all the external characters of good hydraulic cement, it burns into quick lime, or the product being too siliceous will not "set" under water. Depending, as this does, on a certain combination of the ingredients, it is not surprising, that a sedimentary rock, where the materials were transported from different directions, and subjected to the varying action of currents, should often be unfit for purposes where a constant mixture is required. This rock, at Seneca falls, passes into a compact coarse grained mass, and presenting often a geodal structure. The latter character may be seen at the large stone mill in the upper part of the village, where it has been quarried and used for building. The usual accompaniment of irregular or concretionary strata are not visible at this place; the rock passing by insensible gradations into the Onondaga limestone. A few strata of the latter rock are seen south of the falls, and at the quarries near Waterloo; but in general it is not as well marked as in other counties; while the succeeding rock attains a greater thickness, and is more exposed than in the counties westward.

Seneca Limestone. South of Seneca falls, and covering the greater part of an area of five or six miles, occurs the limestone which succeeds the Onondaga. This limestone commences about two miles south of the falls, and extends a mile south of Cayuga village: its southern limit is in a line drawn from this point to Seneca outlet, two miles west of Waterloo. The rock is fine grained, compact, often brittle, and contains thin layers and nodules of hornstone, which have frequently striated surfaces, and are covered with a deposition of carbonaceous matter. They present some analogy to the striated surfaces of portions of the water lime, and some other rocks, but probably cannot have had precisely the same origin. Few species of fossil shells are found in this limestone; the most constant and characteristic one being the *Strophomena lineata*, a shell which I have not seen in any of the limestones, above or below, though it occurs in the shales above the Seneca lime-

stone, and in the green shale of the protean group. Other fossils are extremely rare in this limestone.

Along the area where this rock is exposed, there is evidence of several downheaves; probably caused by the solution and removal of the soft rocks below. These downheaves are connected with, or produced by the same cause as those more important ones on the east side of Cayuga lake, described by Mr. Vanuxem. No manifestation of disturbance appears on the surface; the limestone is scarcely raised above the level of the surrounding country, and the strata observed in the quarries all dip south at an angle of from 4° to 6° . Noting the amount of dip in these rocks, and finding them to occur frequently for a distance of several miles, we might, at first view, be disposed to estimate it as of great thickness. But in each of these quarries we find precisely the same rocks repeated, and the whole apparent thickness consists of a few strata which have been several times broken up. In going south we pass over the northern edges of strata which have been successively raised to the surface, while the intermediate spaces which would exhibit the faults, are filled with alluvium.

In one of these faults arises a copious spring of pure cold water, from the bed of which and over an area of twenty feet, nitrogen gas is abundantly emitted. The force of the water is so great that the whole pool is kept in violent ebullition, which with the constant escape of the gas gives it the appearance of a boiling cauldron. No deposit of any kind is left by the water, which through its whole course to the lake is remarkably clear and limpid. The water from this spring, and another similar, but much smaller one, near, supplies the Canoga flouring mills, a saw mill and some other machinery. From no other spring in this part of the State is nitrogen gas known to issue; all others known in the State being near the junction of transition with primitive or metamorphic rocks. Should it be proved, as Dr. Daubeny has conjectured, that the production of nitrogen is due to the proximity of melted or highly heated materials, it will be some evidence in favor of attributing the faults in question to subterranean or igneous action. Nitrogen has generally been found accompanying the waters of thermal springs, which fact may give plausibility to this theory; but in the springs of Chateaugay,* where nitrogen issues abundantly, the water is cold, (about 40° Fahr. in summer.) The water of the Canoga spring is probably about the same temperature.

* Geological Report of 1837.

The principal quarries of the Seneca limestone are those of McAllister, Rorison, and one belonging to the county adjoining the latter; half a mile south of the last is another extensive quarry, and also one half a mile southwest of the Canoga spring. The stone is quarried for buildings and enclosures as well as for burning into lime. The layers do not generally exceed a foot in thickness, and are separated by thin seams of shale. From six to eight courses of the stone are to be seen in each quarry; each course is generally separated by thin seams of shale, and sometimes by a layer of hornstone; two or three of the latter sometimes occur in the same quarry, separating the courses of limestone. The hornstone is more commonly in courses of nodules in the limestone, sometimes one and at other times several courses occurring in the same strata of the different quarries. When dressed with the chisel it forms an elegant and durable material for stepstones, door and window caps and sills.

The Seneca limestone is succeeded by a group of shales of great thickness, and limited above by a thin mass of limestone, (the Tully limestone.) The group consists of several distinct members possessing characteristic lithological and fossil characters. Most of the rocks of the group are highly fossiliferous, containing abundance of shells and corallines, with three genera and four or more species of trilobites. The different members of the group succeed each other in the following order:

I. *Marcellus shales*. The northern boundary of these shales follows the irregular line noticed as the southern limit of the Seneca limestone, extending across the county from near Canoga to Waterloo, and cropping out at numerous points along the roads and in the small ravines. The lower part is black and slaty, containing limestone in nodules or concretions, and sometimes in continuous strata having a concretionary structure. The fossils are *Posidonia*, a large spiral univalve, *Pleurotomaria*? a spinous *Leptaena* or *Strophomena*, like the *Leptaena spinulosa*, with *Orthis* of two or more species.

The concretionary strata of limestone, apparently result in the same manner as the nodular concretions; in the former case the quantity of material being sufficient to form a continuous stratum. The concretionary structure and seams of crystalline matter, pervade the whole mass, as in the septaria; and petroleum or liquid bitumen likewise occurs in the cavities, with a fluid of a light blue colour, resembling Prussian blue. The same substance was noticed in the cavities of septaria on Cayuga lake, and is mentioned in Mr. Vanuxem's report.

The shale in some places appears to be composed entirely of small fragments of organized remains, and towards the upper part of the mass is a stratum composed of a species of *Orthis*, so numerous and so closely compressed that the form and outline of the shell is nearly obliterated. The points where this shale can be seen are, south of McAllister's quarry, along the east and west road on lot 26, and about two miles and a half south of Waterloo; at this place it contains *Posidonia* and a few other fossils, besides numerous small fragments.

II. *Dark slaty fossiliferous shale*, in Varick and the southern part of Fayette, and of Flint creek, Mud creek, &c. in Ontario county. The upper part of the last described shale becomes very fissile and crumbles rapidly on exposure to the weather. From this it passes into a dark coloured or black slaty shale, readily separating into thin irregular laminæ. Nodules or concretions of limestone are scattered at distant intervals, and never disposed in regular courses. The fossils, both in the contained limestone and in the rock, are entirely different from those in the mass below, being an *Orthis* deeply striated or grooved, and in the shale very much compressed; and a flattened spiral univalve. At many points fossils are exceedingly rare, and the mass, on slight examination, might be mistaken for a non-fossiliferous one.

This shale is exposed along the shore of Seneca lake for several miles above the outlet, and in ravines across the county. On the Cayuga lake it is well developed along Sinclair's creek near Mr. Wicker's, and in a ravine one mile farther south; also along the lake shore.

III. *Compact calcareous blue shale*. The shale last mentioned graduates into a bluish, more compact and less slaty, calcareous shale; which, in the upper part, approaches in character a blue limestone. Some portions of this mass are sufficiently pure for burning into lime. The two masses together attain a thickness of more than one hundred feet, and the whole is characterized by fossils peculiar to itself. One or two species of *Pterinea* occur below the more compact portions associated with *Cyrtoceras*, *Orthoceras*, a large *Delthyris*, *Leptæna*, &c. The *Delthyris* with a long striated spiral univalve, are found in the more calcareous portions.

This part of the series is easily recognized near Tyler's tavern, on the Seneca lake shore, ten miles from Geneva; also on the ravines on Cayuga lake, near Mr. Wicker's, where its projecting edges produce beautiful and picturesque falls. Its great hardness protects the softer shales both above and below, from the rapid destruction which the streams

would otherwise effect. Almost all the ravines where this shale is exposed, appear to have formerly been large water courses, the present streams cutting a narrow channel in the *bottom*, composed sometimes to great depth of water worn fragments of shale, and the rocks above, and covered with soil supporting the largest forest trees. Along the banks of the ravines, the destruction of the shale has produced a thin but rich soil, which, though the rains are constantly washing it down into the valleys below, produces a small growth of trees, and a luxuriant one of flowers, of which a greater variety and in greater beauty, can scarcely be seen. The family of Trillium, the Corydalis, Dentaria, Caulophyllum, Tiarella, and the delicate Mitella, with hundreds of others, spring up in the greatest perfection and profusion. As beautiful objects of natural scenery, these ravines cannot be surpassed.

IV. *Olive shale*. Succeeding the compact calcareous shale, is a more fissile, bluish or olive shale, often containing small nodules or concretions like the claystones, or concretions in common clay: the lower portion of the mass is highly calcareous, partaking of the character of that below; it readily crumbles on exposure to the weather, producing a fertile soil. Above this it becomes gradually more fissile, and of a darker colour, and the fossils gradually diminish, and finally almost entirely disappear. In this rock, for the first time among the shales now described, we meet with a finely striated species of *Orthis*, which occurs in the Rochester shale. Circumstances, however, appear to have been more favorable to its development here than there, as it appears in much greater numbers, and twice the size of the same in the Rochester shale. Another fossil which existed at the time of the deposition of the Rochester shale, again makes its appearance about this period. Trilobites, which are extremely rare in any of the lower shales of this series, begin to appear here, and attain their maximum a few hundred feet higher.

The upper part of this shale becomes of an olive colour, and separates readily into thin laminæ, which are deeply stained with manganese; it contains few fossils, and those noticed, were fragments of *Orthocera*.

This rock may be examined to advantage a few miles south of Tyler's tavern, on the Seneca lake shore, for several miles, though in many places, from its ready destructibility, it is broken down and covered with alluvium. On the Cayuga lake shore, the shale can be examined near Shelldrake point, and along the ravine in the neighborhood. The fos-

sils most abundant are *Delthyris striatula*? *Atrypa concentrica*, and *A. affinis*, *Cyathophylites*, fragments of *Trilobites*, &c.

V. *Ludlowville shales*. The fissile olive shale, noticed as the southern termination of the last described mass, passes into a more compact form, retaining the colour, &c. but characterized by an entirely different association of fossils. Its upward limit is well defined by a mass of limestone, which contains abundance of encrinal columns. The most characteristic fossils are several species of *Pterinea*, and a peculiar *Leptæna*, which has not been seen in any other rock. This shale is exposed from one to three miles north of Hathaway's landing, in Baileytown, on Seneca lake; it also appears in all the ravines which come into the lake near this place.

The same shale is exposed along the lake shore in Cayuga county, near Ogden's ferry, and at Ludlowville. The various species of *Pterinea* are much more abundant at these localities than any yet seen in the Fourth District.

The Encrinal limestone, the terminating rock of the shale last described, maintains a very uniform and constant character from Cayuga lake to the Genesee river. It never attains a thickness of more than four feet; sometimes it is divided into two or three courses, at other times it consists of one only. It abounds in fragments of Encrinal columns, some of which are an inch in diameter, and from half an inch to one or two feet in length. There is occasionally found in this rock a large *Leptæna*, and *Delthyris*, *Cyathophilli*, &c. no other fossil, however, than the crinoidal columns being constant. The rock is generally tough, and not readily affected by the weather, standing out in bold relief from the surrounding shales. It can be seen in the bank of Seneca lake, one mile north of Hathaway's landing, and about the same latitude on the Cayuga lake side of the county.

VI. *Moscow shales*. Above the encrinal limestone the character of the fossils and shale is considerably changed. The principal part of the mass is of a bluish colour, sometimes olive, and in certain localities portions near the upper part are black. Very little of the whole mass is slaty; it generally separates into irregular fragments, and is traversed by seams in various directions. The lower part sometimes contains fine fossils, but the upper portions are the most prolific in fossils of any rock in the district. Most of the shale is highly calcareous, forming by its disintegration a very fertile soil; it is readily affected by atmospheric agents and rapidly decomposed. Along the banks of the lake, and in

the ravines, it is removed by frosts and rains in large quantities, and mingled with the soil, or carried into the bottom lands, where it fertilizes the surface. Calcareous marl and tufa are formed along the water courses, or where water percolates through the loose partially disintegrating shale in banks and ravines.

This rock contains iron pyrites in nodules and irregularly formed concretions; sometimes the pyrites has, in part, replaced or invested a fossil body; and at other times fossils are studded with minute grains, or points, of the same mineral. Excavations for this substance, under the supposition that it was silver or gold, have frequently been made in the lake shore where it is exposed. A locality of pyrites on the bank of the lake in Ovid, was known to a few individuals only, and the matter kept a secret for several years. Large quantities of the mineral were taken out, always during the night, and after obtaining sufficient, as they supposed, to enrich themselves, one of their number was about to be despatched to New-York to learn the manner of extracting the metal from the ore, when their dreams of fortune were suddenly ended by learning that their supposed gold was a compound of sulphur and iron.

This shale is well exhibited on the Seneca lake shore, between Hathaway's landing and Goff's point. Some part of the mass along this distance is black, and at first sight might be mistaken for some of the shales below, but the contained fossils are always a sure guide. The rock is also exposed by several deep ravines, which extend from the lake along this distance, gradually becoming smaller, to near the centre of the county. On the Cayuga shore this shale is exposed from near Kidder's ferry to within three miles of Ithaca.

This member of the group embraces a thin mass of black slaty shale which contains abundance of *Orbicula*, a deeply grooved species of *Orthis*, and a small *Leptæna*. These fossils are all confined to a few feet of thickness, and are rarely, if at all, seen above or below. The *Orbicula* is so abundant that in one specimen in the State collection, more than eighty individuals are seen in a space of less than a square foot. The same *Orbicula* with the *Orthis*, occur in great profusion in a shale much higher in the series, which will soon be described.

This shale is so well developed, and contains the fossils, particularly trilobites, in such great perfection, at Moscow, Livingston county, that I have given it that name till a more appropriate one shall be found. This member terminates the group, a very marked change occurring in the

rocks and fossils, succeeding the limestone which follows. The *Calymene bufo*, and *Cryphæus calliteles* are characteristic fossils of this shale.

"*The Tully limestone*" succeeds the shales just described: the greatest thickness of this mass of limestone, in Seneca county, does not exceed sixteen feet; but it extends over a great area, maintaining a very uniform character. It is of a light bluish gray colour; in some localities blue, fine grained and very compact; it contains few fossils, and those of the same species as in the shales below. This rock presents many of the characters of the Seneca and other lower limestones; and in hand specimens does not appear to differ from these, but is readily distinguished by its associations from any of them. The mass consists of three or four layers, for the most part of uniform thickness. It is not generally fit for building stone, being traversed by seams in all directions, and breaking into irregular masses. In some localities the whole mass crumbles, on exposure, into small fragments, from half an inch to three inches in length and breadth, but presenting no further tendency to decomposition. The fragments are all clay coloured on the exposed surfaces, resembling in this respect some of the harder gypseous marls.

There are a few localities where this rock is very compact; the layers are from one to two feet thick, and it can be quarried of any required dimensions. Its northern edge extends in a curve entirely across the county. From where it is first seen it may be followed in a northeasterly direction to a point two miles north of Ovid village, where it is quarried for burning into lime, and for various other purposes, on the land of Mr. Thompson Johnson. This point is the greatest northern extension of the curve. From here it gradually bends to the southeast, and appears on the Cayuga lake shore, in a line nearly east from its point of appearance on the Seneca lake shore. This curved outcropping of the mass is merely the effect of erosion; the greatest force of the northern current being in the channels of the two lakes, its force was diminished towards the centre of the county, which consequently left the limestone extending farther north at this point.

This mass being so distinct in appearance from the shales above and below, manifests, very clearly, the beautiful undulations produced by subterranean action upon the contiguous rocks. At the point where the limestone first appears, in a ravine near the lake shore, it is sixty feet above the level of the water; half a mile south of this, it comes to that level, and after disappearing beneath the water for a short distance rises again toward the south and soon disappears from the lake shore.

The ascent to the south continues for more than half a mile, at which point it has attained an elevation of sixty or seventy feet above the lake; here the rock becomes nearly horizontal, and so continues for nearly a mile, when it again dips to the south, and disappears for the last time beneath the lake a short distance south of Goff's point, and four miles from its first appearance. The shale, both above and below pursue the same undulations, proving that this appearance does not arise from the limestone having been deposited in an uneven bed in the shale. From this rock appearing at so great an elevation above the lake at two distant points, it might, unless carefully observed in its southern ascent, be mistaken for two beds, occurring several hundred feet apart; and it is only from investigations along the lake shore, that we are able to point out the precise cause and manner of its recurrence at a point so far south of its outcrop.

Undulations of the strata are not confined to the extent here mentioned, and we shall have occasion to allude to the same phenomenon in rocks farther south; though nowhere so well exhibited as in the case just described. A corresponding undulation is seen in the Tully limestone, on the eastern side of the county, also on the eastern shore of Cayuga, and on the western shore of Seneca lake, the amount being about the same in each place. The points of final disappearance of the rock beneath the water on either side of the same lake are nearly opposite each other, or in the same line of latitude. This limestone generally contains few fossils; in some localities, *Calymene*, *Cryphæus*, and *Atrypa affinis* are found in considerable numbers, and may be considered the characteristic fossils of the rock. The transported masses of the same rock which have been found many miles south, all contain the same fossils, and thus enable us to refer the loose masses to their original place.

The erosive action of the lake waters has removed the shale below the limestone in many places, causing it to fall into the lake, where huge masses are seen to line and protect the shore for considerable distances. In Seneca county these masses are raised from the water and carried by boats to the head of the lake, and up the Chemung canal, where they are burned for lime.

Upper Black Shale. Reposing upon the Tully limestone we have a thickness of 150 feet of shale, exhibiting throughout a uniform black colour, and slaty structure. It differs from the black shale below in being more brittle, the surfaces of laminæ grained or rough, and contain-

ing abundantly thin minute scales of mica, requiring only a higher degree of heat to have become a micaceous schist. The greater part of the mass, except the upper part, is almost, or entirely destitute of fossils. In this county it is characterized as containing two species of *Lingula*, *Orbicula*, and a species of *Orthis*, which fossils are constant associates in the upper part of the mass. Farther west it contains other fossils, and finally becomes fossiliferous through its whole thickness.

This shale can be examined in all the ravines along the lake shore from near the north line of Ovid to six miles south. Being succeeded by a harder rock, which protects the upper part from the erosive action of water; the black shale is, in some instances, exhibited in nearly its whole thickness at one view. Among the places where it can be examined to great advantage, is at a fall of water on lot No. 26, in Ovid, and at Lodi falls on the west side of the county, in several ravines on the east side, and at Goodwin's falls in Tompkins county.

The shale is uniform in texture, and before weathering is quarried in symmetrical blocks of various dimensions, being separated by the vertical seams, or joints, which traverse the rocks in two directions, one being from east to west, or from east by north to west by south, and the other varying from NE and SW to N $\frac{1}{2}$ E and S $\frac{1}{2}$ W. The direction of these joints is never at right angles to each other, but varying, generally crossing at inclinations of about 75° and 105°, the blocks splitting into rhombic forms. Such joints are not confined to the shale, being very perceptible in many other rocks of the district, though in none so eminently as in this. The black shale is used for a fire stone, and when laid with the edges of the laminæ to the fire, will last for a long time.

Resembling very nearly in appearance the black shale of the coal formation, this rock has often been mistaken for the same, and explorations for coal have frequently been undertaken at great expense, and resulted in final disappointment and loss. Most of the excavations for coal in this part of the State are made in the black shale, or the next succeeding mass, which often contains fragments of vegetables. The emission of inflammable gas, particularly when arising from this rock, is supposed to proceed from beds of bituminous coal. Although the fallacy of such a supposition has been frequently shown, the opinion is still entertained, and the assertion often repeated.

The black shale is sometimes succeeded by a well defined layer of sandstone, a foot or two in thickness; more generally, however, the black shale passes into a more siliceous and compact olive shale, the line

of division between the two being sufficiently marked. The shale of this group frequently alternates with thin layers of sandstone, and from slaty becomes more compact. The whole mass consists of alternations of slaty and compact shale, with an argillaceous sandstone in layers from an inch to eight inches thick. The surfaces of the sandstone layers are frequently covered with fucoides, but in Seneca county the most abundant remains are fragments of terrestrial vegetables, which in some cases are so numerous as to cover the surfaces of the thin strata. Some of these fragments are several feet long and half a foot wide, presenting externally the vegetable structure, while the interior is changed to coal. These seams of coal are from a quarter of an inch to one or two inches in thickness. Their occurrence has frequently induced explorations for coal, on the supposition that the thin seams were leaders which communicated with extensive beds of that mineral. It is needless to say that there is no foundation for such belief, all the carbonaceous matter being derived from detached fragments of vegetables deposited with the sediment forming the rocks, and in no case presenting evidence of any large accumulations of the same material.

About four miles south of Lodi village an excavation for coal has been made in the mass. The principal inducement in this case appears to have been pyrites and the sulphurous odor of the water, which is covered with a film so common in water flowing through pyritous or other rocks. Petroleum also occurred in globules on the lower surfaces of the slaty layers, which circumstance was considered by an "old miner," who directed the excavation, as a sure indication of coal. When I saw the place the original excavation was filled with dirty water, and the shales thrown out were nearly dissolved into soil.

Some tolerable flag stones are obtained from this group in the town of Lodi, and Mr. Wyckoff has used the same in the construction of a mill at Lodi falls.

A portion of this group is characterized by certain fossils, some of which differ from any above or below; these fossils are a large *Orthocera*, *Cyrtoceras*, *Lingula*, *Posidonia*, and a peculiar grooved or ribbed shell, either *Avicula* or *Pterinea*.

This group is exposed in many of the ravines south of Lodi village, on the Seneca lake shore, and also in the same latitude on the Cayuga shore, in the south part of Covert, and in the ravines extending towards the middle of the county. The group is also well developed a short distance south of the county line at Goodwin's falls, as will be mention-

ed under the head of Tompkins county. Near the village of Penn-Yan the same group is perhaps better displayed than in any other place examined. Its fossils being so distinct and peculiar place this in an independent group, or it may be joined with the black shale below, and constitute a characteristic group composed of the two members.

The rocks of this group are the highest in Seneca county, extending southward into Tompkins, where they are succeeded by another group, which will be described under the head of that county.

ONTARIO COUNTY.

In this county we find the same rocks, and in the same general order, as in Seneca. The "*Saliferous Group of Onondaga*," occupies that part of the county which lies north of a line drawn from a point one mile north of Oak's corners, in the town of Phelps, along the course of the Canandaigua outlet to Manchester, and thence west to Victor. The vast accumulation of alluvial, however, leaves the rocks exposed but at few points, which are mostly along streams. In a few cases, what externally appear to be alluvial hills are isolated masses of gypseous marl, &c. deeply covered with alluvium; and in some instances small masses of gypsum have been found in these, much above the ordinary level of the valleys and surrounding country. Admitting that the gypseous mass originally held a higher elevation, and equal to that of the alluvial hills, before the intermediate portions were transported southward, the fact proves the vast quantity of matter removed by alluvial agency.

This group of rocks is much better exhibited in Ontario than in Seneca county; having a greater extent, and in one or two places developing a different character. The gypsum here occupies three distinct ranges; the northern or lowest appearing upon or just north of the county line, and the other two within the county. In the first the gypsum is associated with a gray marl, which reposes on a green marl containing no gypsum. The gray marl exhibits iron stains and decomposing pyrites; and pyrites is also found with the plaster which occurs in small, irregular masses, having a granular or crystalline texture, and frequently accompanied by selenite. Masses of selenite are very abundant in the marl, varying from the size of a walnut to several pounds weight, isolated as regards themselves, and having no connection whatever with the larger masses of gypsum. In appearance and mode of formation they are very analagous to those found in the marly clays of the Tertiary formation. The limpid selenite often embraces a small

piece of solid marl, having its faces and edges grooved or striated as in the pseudomorphic crystals of muriate of soda.* The gray marl is also traversed by seams of gypsum, generally flesh coloured or reddish, in such quantities that the whole is ground and sold for plaster. Both the green and gray marl rapidly disintegrate and form a tough clayey soil.

The second series is developed near Port Gibson, and also about a mile distant, at an elevation of twenty-five or thirty feet above the Erie canal. An argillaceous limestone appears on or near the surface in low knolls or hillocks; this rock, on removal, is found to be fractured, as if upraised from beneath, and at the depth of four or six feet, is found a flattened, spheroidal mass of gypsum. It is always of this form, and quite disconnected with the surrounding rock. This gypsum is fine grained, compact, contains no Selenite, and in general appearance is quite different from that last described. The surrounding fractured rock is in thin layers from four to six inches thick, which break into pieces from one to three feet square. The surfaces present numerous little seams or cracks, similar to those produced in clay on drying, and the sides of these are all smooth, and appear worn as if by the passage of water. This character is very constant, so far as has been observed, and serves better than any other to distinguish the rock. The external colour, after weathering, is that of common clay; on fresh fracture, it is bluish, often nearly black. Water is with difficulty obtained along the extent of this formation; the fractured rock beneath admitting the percolation of water so rapidly as entirely to drain the soil, the little hillocks become in summer too dry to support vegetation. Very little gypsum has been obtained from this series in Ontario county, though it seems to be the same which furnishes a great part of that mineral in Monroe county. It will doubtless be explored after the supply along the Canandaigua outlet in Phelps, becomes exhausted.

The third series embraces the gypsum which is extensively quarried in the town of Phelps, between Vienna and the town line of Manchester, along the Canandaigua outlet. West of this point, one or two masses are seen in the bank of the outlet; and with this exception, and a single bed recently opened near Victor, the town of Phelps furnishes all the gypsum from the county. This with its associated rocks are very similar in character to those on the Seneca outlet. It occurs in the same irregularly shaped or somewhat conical masses, producing no disturbance in the surrounding strata; while the lines of stratification in

* Their form, however, is less regular, and they occur much lower in the series.

the marl pass through the beds of gypsum, and in several instances where one or two thin courses of hard argillaceous limestone occur in the former, these also are continued through the latter, the intervention of the rock merely breaking the continuity of the plaster without otherwise affecting it. In this series, the force of aggregation or chemical attraction seems not to have been sufficiently powerful to separate the gypsum from all surrounding materials; consequently we find it much intermixed with the marl, and wherever the attraction of particles was stronger than in either of these, as in the limestone, the strata continued their course through the mass, scarcely interrupted at all. The greater tenacity of the latter may have prevented the mobility necessary to an entire separation of particles, and from this cause in part may arise the admixture of substances.

The course of the Canandaigua outlet, from Manchester village to near Vienna, is along the line of the Saliferous group and water lime, leaving the latter entirely on the south, and the former, with the exception of a few beds, on the north. East of Vienna, all the marl and gypsum has been removed, and is replaced by a deep deposit of sandy alluvium; in the west of Manchester, the same circumstance is observed, and on the north side of the outlet, instead of the gypsum, we find alluvial hills rising eighty or one hundred feet above the valley, but not appearing south of the stream. From Manchester to the west line of the county, a low valley extends along the southern boundary of the gypseous rocks, with alluvial hills rising on its northern side. The original course of the Canandaigua outlet appears to have been north; and it is very evident from the character of the rocks along which it passes, after turning east, that this portion at least was excavated recently, or long after the deposition of the alluvium, which may have closed its northern egress.

The principal quarries of gypsum are those of Robinson, Norton & Co., Cook, Vandermark & Co., and Hildreth. From these, about six thousand tons annually are ground at the mills on the outlet, and sold within the county. The supply is sufficient for a much greater amount, and unless the demand increases, the quarries will not be exhausted in many years. Whenever this happens, explorations will extend north of the present quarries; and in all the valleys along the north part of the county, the middle series of plaster beds will probably be found.

The water limes are better developed in this county than in Seneca, appearing in their characteristic drab colour. The mass may be traced

almost uninterruptedly from near Oak's corners, in Phelps, to Manchester village; and beyond this it appears at many points, as on Mud creek, and near Victor village. East of Vienna, all the strata of this series are highly calcareous, and burned only for common quick lime. The principal quarries and kilns are within one and a half miles of the village. It is also quarried for buildings and enclosures, the layers being sufficiently thick. It becomes stained with iron on exposure, and in almost every locality is highly bituminous.

At Vienna, this rock is burned for hydraulic cement, and is said to form it of very good quality. Two miles farther west at the quarry of Mr. Maffit, large quantities have been used for this purpose. At this place the stone varies little in external characters from that used for lime. It consists of three distinct varieties; two only are used for the cement, while the lower course is composed of thin layers of tough argillaceous bluish limestone, breaking on exposure into small irregular fragments; and in mineral character precisely the same as the strata which pass through the gypsum beds. This portion on burning, melts into a coarse porous slag, externally glazed and yellowish. The second stratum consists of thin layers, externally drab coloured, silicious in texture, and harsh to the touch. This is succeeded by a few layers of irregular thickness, lighter in colour than those below, and much more calcareous. Of the two last mentioned, each at intervals partly takes the place of the other, so that their thickness is variable, and the dividing line takes an undulatory direction. The whole depth of the two masses together varies from three to seven feet. If the lower of these is burned alone, the cement will not "set" under water; and if the upper is burned alone, it is found to be too calcareous, and less enduring than the more silicious cements. To obviate this difficulty, both are burned together, but without regard to proportions. From the nature of the materials, it is evident that the proportion of silicious and calcareous matter must be very variable, and too little attention has heretofore been given to this circumstance, and to the nature of the ingredients, in the manufacture of hydraulic cement.

West of the last named quarries, the water lime appears in numerous localities south of the outlet, and near the road leading from Vienna to Manchester; but here it is used mostly for enclosures, and at Manchester village for building stone, some of the layers being two or three feet thick. It is too soft and argillaceous for hydraulic cement or good lime. Above the village of Fredon, this rock is exposed in all its varieties, for half a mile on Mud creek, and along the whole line from

Manchester to that village it approaches the surface, and could easily be obtained in any required quantity. Thence it extends west to the quarries in Mendon, though the surface of the intervening space is mostly covered with deep alluvium.

At Maffit's quarry, in Phelps, the drab limestone is succeeded by several feet thickness of bluish gray limestone, which divides into thin laminæ by parallel seams; when struck with a hammer, it yields a metallic sound, like some of the trap rocks. On the surfaces of the laminæ are found *Cytherina* and a species of *Orthis*, which are the only fossils I have seen in connection with the drab limestone. This rock, when exposed to the weather, presents numerous linear or needle form cavities, frequently almost covering the surface of the stone; these result from the decomposition and removal of thin crystals of strontian which have pervaded the entire mass. Specimens are frequently obtained where the crystals are preserved, and others where they are only partially removed.

The Oriskany sandstone, is well characterized in the Third Geological District, and described by Mr. Vanuxem; it appears but at one point in this county, and not at all in Seneca, being either entirely wanting or deeply covered with superficial materials. This rock could be easily identified did it exist, but I have yet seen it only in Flint creek, at Vienna. Here it is a coarse porous sandstone, destitute of fossils, so far as observed, with the exception of a single specimen of *Icthyodonta*; the large *Orthis* and *Delthyris*, which characterizes this rock in the Third District being entirely wanting. Its purely silicious character and porous texture are well adapted to withstand the effects of rapid heating and cooling; and at the locality mentioned it is much quarried for free stone, and used in the Ontario furnace, and in the glass furnace at Clyde. It contains numerous small geodes lined with chalcedony; also rounded masses of a dark rock are imbedded in its surface. These, on examination, prove to be very compact aggregations of fine sand, coloured with carbonaceous matter, and may have resulted, as well as the chalcedony, from the long continued action of Thermal waters.

At the place where this rock is quarried, it is four feet thick, divided into two or three layers, one of which is about two feet. It rests immediately on a slaty, argillaceous limestone, four feet thick, which succeeds the water lime proper. The thin layer of conglomerate mentioned in the report of last year as separating the drab limestones at

Tinker's quarry from the gray and blue limestones above, is the representative of this rock, which, we learn from Mr. Vanuxem's report, attains in the Third District a thickness of thirty feet, and contains abundance of peculiar fossils. This rock, the "shell grit" of Prof. Eaton, is a well characterized mass in the Helderberg range, interposed between the upper and lower limestones.

The "*gray crinoidal*," or *Onondaga limestone*, which follows the Oriskany sandstone, is well characterized, and distinguished from any other by its peculiar gray or grayish blue colour, and compact crystalline structure. It is tough, breaking with a large conchoidal fracture. When free from seams, it is perhaps the most durable of the limestones, and one of the most beautiful for buildings. For this purpose it is much quarried; and at Oak's corners, its eastern limit in Ontario county, it is also burned for lime. It is very abundant as a surface rock.— In several localities there is a gradual merging of the water limestone into this rock, the Oriskany sandstone, which should intervene, not being in place. In most instances the strata succeeding the water lime are an irregular gray limestone, containing abundance of fossils, mostly in fragments, or single valves of shells. Fragments of *Calymene* are very numerous, but perfect specimens are rarely or never found. *Strophomena rugosa*, *Orthis affinis*, and several others, are abundant. A large species of *Orthis*, peculiar to the Oriskany sandstone, or "shell grit," sometimes accompanies the other fossils in this part of the formation, and *Madreporites*, *Cyathophyllites*, &c. are found above the more shelly portions of the rock.

West of Vienna this limestone spreads out over a great surface, covered only with a thin coating of soil, and having its northern termination about a quarter of a mile south of the Canandaigua outlet. It extends to Flint creek. The principal quarries in this neighborhood are McBurney's and Wayland's, within two miles of Vienna, which furnish materials for locks on the canal, for building and step stones, and some partially crystalline portions, from the unequal expansion, form a good firestone for the ordinary heat of a fire place. At these quarries four layers of limestone are exposed, two of which only are workable, the others being too thin, or separated by seams. The upper one has in many places been nearly destroyed by the action of running water. Sometimes layers of chert, or hornstone, are interspersed between those of the limestone; and some of these contain much of that mineral, while in others it occurs only in small nodules. In such cases it does not injure the quality of the stone, but where it occurs in large masses

the surfaces cannot be worked smooth, and where the stratum in place has been exposed, the mass is often fractured around the hornstone.— When the lower layers abound in chert, they contain few or no fossils, while those containing little of it are filled with them. Further west this rock is exposed at many points; at the Manchester sulphur springs, half a mile and two miles west of this, and again in the outlet a mile above Manchester village; from this point it preserves nearly a west course to Mud creek, near the residence of Judge Lapham.

Last summer I examined a quarry of the same rock in Livingston county. This is opened for the purpose of supplying stone for the construction of locks on the Genesee Valley canal, and the engineer will do himself credit, as well as secure the permanency of the work, by using these in preference to any of the sandstones south; although the expense of transportation will exceed that of others which might be procured on the line of the canal.

The Seneca limestone succeeds the Onondaga, and in some instances alternates with it. In Ontario county it follows the same course, and can be seen a little south of the outcropping edge of the Onondaga limestone. It is recognized by its darker blue colour, fine texture and homogeneous structure; it is generally very brittle, breaking with a slight blow of the hammer, while in some localities it furnishes stone fit for building. Like the Onondaga, it contains much chert or hornstone. At its eastern termination in this county, about half a mile south of Oak's corners, on the land of Mr. Jones, it presents six distinct strata, each separated from the next by a thin layer of shale or hornstone.

The upper stratum bears evidence of the erosive action of water, as of a powerful current bearing hard substances along in its course. At this point the limestone suddenly terminates, as if broken off and removed, leaving an abrupt descent to the east; and reappears at a distance of six or seven miles near Waterloo. The mass of limestone has evidently been removed from all the intermediate space, which once formed part of the valley of Seneca lake; and not only this rock, but all those in the same line north, as none are seen until we approach the shore of lake Ontario. In numerous places the bays extend inland towards Seneca lake, with which, probably, they originally communicated, while the great depth of alluvium in many places along the shore of lake Ontario, conceals the rocks if they are present. The limestone is also removed from the space occupied by the waters of Cayuga lake,

which fill the valley covered, in the former case, with alluvium. The beds of both lakes seem to be where the strata were originally more depressed than either on the east or west, consequently at a period when the whole surface was covered with water, this would be the natural course of the current. From some cause it appears to have divided and taken the two channels of Cayuga and Seneca lakes, and to have found its outlet far south, after joining other currents from different quarters.

From Jones' quarry we trace the limestone westward. It appears on Flint creek, above Vienna, and at several points along streams between this place and the Canandaigua outlet. In the bed of Flint creek, and also on the outlet, it contains a large quantity of hornstone, which, on weathering, gives the mass a peculiarly rough and ragged appearance. It is exposed in the bed and banks of Mud creek, at Lapham's mill; and here we procured a fine specimen of *Ichthyodorulite*. This fossil has been found in the same limestone at Waterloo; and an exceedingly beautiful specimen is preserved in the cabinet of David Thomas of Aurora. At the last named locality in Ontario county, the upper part of the Seneca limestone is light gray or almost drab, very fine grained and compact; it contains a trilobite, *Asaphus*, with the post-abdomen armed with two spines, and well merits the appellation of *spinulurus*. This rock is quarried in many places, both for building stones and lime. For the latter purpose the upper layers are preferred; they break readily into thin pieces, and contain great numbers of *Orthis affinis*, or a similar one, and *Strophomena rugosa*. Quarries are worked near Oak corners, along the Canandaigua outlet at Bates' mill, Gardners, &c. west of the outlet between this and Mud creek, and other places.

The Seneca limestone embraces a shaly stratum, containing great numbers of a small fossil, resembling a *Cytherina*, so minute as scarcely to be distinguishable by the naked eye; and in some instances the stone is literally made up of these shells, appearing to have been once a living mass. This stratum is well exhibited in Mud creek, on the Canandaigua outlet at Short's mill, and near the Eagle mill on Flint creek; through which extent it bears a very constant character.

The Onondaga and Seneca limestones occupy, throughout this county, a width of two miles; varying somewhat along the streams which have exposed the southern rocks and worn down their northern edges, leaving a slight curve to the south. The whole northern edge of these rocks presents an undulatory or indented outline; some points extending a mile further north than the alternating indentation.

The course of the limestones just described, can be easily traced by the elevated terrace formed by the line of their northern outcrop. Their superior hardness withstood the erosive action of water, while the softer gypseous rocks, and water limestones on the north, were excavated to a much lower level, producing in one case a valley, in the other a corresponding elevation. Where this terrace is unbroken, the alluvial hills for the most part terminate in the valley north, or on the gypseous formation; and the deposition of transported matter in such abundance along this line, is doubtless owing to the partial check which the current received from the limestone elevation south.

The terrace here described, must not be, as it often is, confounded with that extending east from Lewiston, the mountain ridge; the latter is entirely a different rock, though the outline is produced by similar means and from similar causes. The mountain ridge is not perceptible east of Rochester.

In this county, as in Seneca, the black shale succeeds the Seneca limestone; and possesses the same essential characters. It appears in the banks of several small streams in the eastern part of the county, though its immediate connexion with the limestone has not been observed. On Flint creek, three miles from Vienna, this shale is extensively developed. The lower part is compact and highly bituminous; it contains much pyrites, and the decomposing shale effloresces large quantities of sulphate of alumine. On the Canandaigua outlet it is not so well developed; nor at any intermediate point; for the force of the original water having widened the channel, leaves the shale now covered with alluvium. On Mud creek, it is seen above the locality of the Seneca limestone, near Hill's mill.

The different members of the shale series succeed the last mentioned in the same order and with the same characters as in Seneca county. These I shall speak of together, deferring the minute distinctions to a more detailed report. Several members of the group are well exhibited in the ravines and on the shore of Seneca lake, above Geneva. Along Flint creek, from two miles below Orleans to the village of Bethel, they are seen in great perfection. The upper mass is particularly well developed at Monteith's point, on Canandaigua lake, and the Encrinal limestone appears about half a mile below. The shale is seen in many places along the eastern shore, and in all the ravines entering the lake, for seven or eight miles south of Canandaigua.

The mass of encrinal limestone, which has already been mentioned as dividing the upper mass of shale from that next below, occurs in great perfection along this lake. Large masses have been transported to the foot, and lie along the beach and in the wall which protects the road from the action of the water. Some of these boulders contain few or no encrinal columns, but their other characteristics refer them to this formation.

Along Mud creek the shales may be seen at various localities, and in all the large ravines; but in the smaller ones their decomposition has formed a soil which in many cases conceal the rock. In the western part of Ontario, and particularly west of Mud creek, the alluvial hills have covered the underlying rocks as far south as the extent of these shales; while in other counties the southern limit of the high alluvial hills is generally, except in valleys, the limestone range before described.

The Tully limestone I have observed but at two points in Ontario county; one in the bed of Flint creek at Bethel, and only visible when the water is low; the other four miles northwest of that village, near the main road and about a mile from the north line of the town of Gorham; there it consists of a single layer three feet thick, and exhibits the characteristics of that rock. This point is on the elevated land between Flint creek and Canandaigua lake; the surface slopes in either direction towards the valleys, which are valleys of denudation. These produce very irregular lines of outcrop.

West of the point last named, I have not seen this limestone, although its place in the shale is well defined for many miles along Canandaigua lake.

The line of distinction between the lower shale and the black shale succeeding the Tully limestone, is well defined as far west as the Genesee valley. It occupies the southern part of the town of Seneca, and appears in some places in the more elevated parts; and in Gorham extends several miles north along the high ridge between Flint creek and Canandaigua lake. West of Canandaigua lake this shale spreads out over a much greater extent of country, passing through the towns of Cheshire, Bristol and Richmond, and becomes fossiliferous in all its parts. It appears on Mud creek and in the ravines and streams about the outlet of Honeyoye lake. The burning springs, so called, of Bristol, proceed from the carburetted hydrogen, arising from this shale; the numerous localities will be mentioned in another place.

The group succeeding the black shale occupies the towns of Naples Canadice, and the south part of Bristol, and presents the same essential characters as described in Seneca county. Alternations of compact shale and argillaceous sandstone compose the group. The sandstone portions are used for flagging stones, and when sufficiently thick, for building stones.

These rocks are seen to great advantage in the deep ravines about the head of Canandaigua lake and in the banks of the Honeyoye, Canadice and Hemlock lakes. These three lakes at present join their outlets, producing the Honeyoye creek, which has been excavated since the deposition of the alluvium; and the rocks are exposed along its whole course. The original outlet of these valleys was probably farther east, and joining the present Irondequoit, passed into Lake Ontario by that channel. These valleys also extend south, and meet the Conhocton, showing that at some former period the course of the water was not restricted within its present limits, but extended south to the Tioga or Chemung. Thus a stream whose width embraces the valleys and beds of the lakes in this direction, may have passed southward from Lake Ontario to the Susquehannah; or, otherwise, a stream from the south may have flowed along the Conhocton and these valleys to Lake Ontario. It is quite evident, from the extent of the valleys and the alluvium piled up in their course, that few of our streams in an earlier geological era had their present origin, or were limited to their present extent. Every valley and every rock bears marks of the great current, of which small under currents merely wore the course of the present valleys, while the mighty whole passed over the highest points of our hills.

YATES.

The rocks of the greater part of Yates county correspond with those of the southern portion of Ontario, and only the most elevated parts of the towns of Barrington and Starkey contain other rocks.

The black shale above the Tully limestone, occupies the north part of the towns of Middlesex and Benton, the southeastern part also of the latter exhibiting this shale and the rocks below; the superior rocks having been removed over that part of the country east of a line drawn from Penn-Yan to Seneca lake, near Bellona. The outlet of Crooked lake, now narrowed to a small stream, once flowed northeast along the valley from Penn-Yan, nearly in the direction of the east branch continued.

From Penn-Yan to Seneca lake, the southern limit of the upper black shale is the right bank of the outlet, where both this and the succeeding rocks are seen to crop out. The present outlet has cut itself a channel through the upper black shale, the Tully limestone, and about one hundred feet into the shale below.

Northwesterly from Penn-Yan to Shepherd's quarry and the adjoining ravine, we find the group of argillaceous sandstones and shales next succeeding the black shale. At this place the lower portion of the mass consists of hard and soft strata, containing much iron pyrites and large fragments of carbonized vegetables; and occasionally other fossils which are characteristic of the group, as the large *Orthocera* and a *Pterinea*. Above this are thirty or forty feet of shale, containing *Posidonia* in great abundance, and embracing a single layer of striped sandstone. This shale is succeeded by two layers of sandstone, and these are again followed by a thick mass of shale.

The lower part of the group furnishes large and fine flag stones, which are used in the streets of Penn-Yan. These thin layers often contain small irregular concretions, surrounded by a coating of shale which soon disintegrates and the concretions become loosened, in many instances injuring the stone. Some of these strata are shaly and soon wear away on exposure.

This group appears about a mile south of Penn-Yan, in Sartwell's ravine; where its connection with the black shale below is very evident; the characteristic *Lingula* of the latter are found in abundance, and succeeded by a thick mass of more silicious, non-fossiliferous shale.

The same group extends west through the towns of Jerusalem and Italy, and appears in many of the streams and ravines near the west branch of Crooked lake. The thin layers of sandstone are used throughout the country for step-stones, foot-walks, and in many instances for enclosures, though rarely for building stones.

It is chiefly along Crooked lake outlet that we find any rocks below the groups last described. Here, in the descending order, are the black shale, the Tully limestone, and the upper member of the group next below, (*Moscow shale*), consisting of bluish or olive and dark shales with an abundance of fossils. Descending the outlet about a mile and a half from Penn-Yan, the black shale first appears, forming both banks of the stream as far as Mallory's mills, sometimes rising forty or fifty feet above the bed of the stream, and at others merely visible beneath

the alluvium; as in most localities east of Canadaigua lake, it is almost destitute of fossils. On the south bank near Mallory's, a road cut through the shale exhibits it to great advantage; also Bruce's ravine farther south. Next succeeds the Tully limestone seen at Wait's mill, where the water of the outlet falls over it. Thence it dips east for more than half a mile and disappears, and shortly afterwards it reappears, dipping to the east. No dislocation or disturbance of the rocks is visible at any point, and the change appears to be owing to an undulation, similar to that observed on Seneca lake, which is at right angles with this. The ascent of the limestone to the east, or its dip west, is about ten feet in the mile, as ascertained by tracing it through that distance. At Hopeton, the limestone is sixty or seventy feet above the bed of the stream, and about one hundred feet above the lake. Beyond this point, it has been entirely swept off by the waters of the original outlet.

The Moscow shales are seen at Wait's mill, and also at Mallory's mill, and along the bank of the stream to within half a mile of the lake shore. At Hopeton, about sixty feet of it is visible, containing the usual fossils in abundance. Here the shales and Tully limestone are beautifully exhibited in a little conical hill, which stands isolated in the valley of the outlet, a monument of the power of ancient waters. The hill is about one hundred feet broad at the base, and perhaps eighty feet high. The first sixty feet are of the shales last described; then succeeds the Tully limestone, and the top is capped with a few feet of black shale.

The same undulations as those noticed on the east of the lake, occur on its western shore south of Dresden. The Tully limestone and black shale soon disappear below the level of the lake, and the next series continues to dip in the same direction, till within one or two miles of Big Stream point, or about eight miles from Dresden. Here the rocks begin to ascend to the south, and half a mile south of Big Stream, the black shale appears above the lake, and continues rising for a mile or more, where it attains an elevation of forty feet above the water, and begins to descend southward.

A circumstance worthy of notice is that at this point, and extending as far as the shale continues above the level of the lake, this rock contains within five or six feet of its upper surface, a concretionary mass of silico-argillaceous limestone, from three to five feet thick, consisting of three layers divided by interposed seams of shale. The lower stra-

tum is irregular and more concretionary, sometimes appearing to be merely individual masses of *Septaria* joined at their edges. It occupies nearly the place of a course of *Septaria* elsewhere occurring in the black shale: it doubtless results from an aggregation of a greater or less proportion of calcareous matter; so that what in one place becomes a few isolated masses of *Septaria*, in another is a continuous stratum four or five feet thick. Above and below this are the usual fossils of the upper part of the black shale. This limestone is burned and used for hydraulic cement in mill dams, at Big Stream point and elsewhere; and is considered better than any obtained from other quarters. Mr. Townshend, of Big Stream point, is now erecting a mill for grinding it after burning. The mass is situated in the bank of the lake, where boats can approach for loading, and thus the facilities for transportation will be great. If it prove equal to the expectations of the proprietor, it will supercede much of the material now used as hydraulic cement.

Between Seneca lake and the east branch of Crooked lake, a high ridge or elevated plain slopes gradually to both, being divided transversely by the ravines and streams. Another elevated table land, varied by slight undulations, rises between Seneca lake and the valley of Flint creek, which extends to the head of the west branch of Crooked lake; this is interrupted by a depression to the northeast of Penn-Yan. Another similar portion, though more irregular, rises between the valleys of Flint creek and Canandaigua lake; and the part of the county between the two branches of Crooked lake terminates in a high bluff, called Bluff point. From near the head of the west branch, extending quite across the peninsula, is a valley which appears once to have connected the two branches; the highest point is now not more than one hundred feet above the lake. The soil of this county ranks among the first in quality.

TOMPKINS.

The northern portion of this county, between Seneca and Cayuga lakes, is underlaid by rocks of the group last described in Seneca county. These, as well as the rocks below the black shale, Tully limestone, &c. appear in all the deep ravines communicating with the lakes, and are finally exhibited at the gorge of Goodwin's falls. This is an immense chasm, into which the water descends perpendicularly one hundred and ninety-three feet, from the bottom of which we see the amphitheatre of rocks rising around us, and by the effect of perspective, closing over us three hundred feet above our heads. The black shale visible for eighty feet above the Tully limestone, is succeeded by more than

two hundred feet of the next series, before described, consisting in the lower part of a mass of silicious shale, and above alternating with argillaceous sandstone. The surfaces of this rock are often rippled and covered with minute fragments of vegetables, which seem to follow the course of the marking, and accumulate or diminish with the ripple wave. The same appearance is presented by a beach of sand, where the ebbing tide leaves fine fragments of vegetable matter arranged in quantity and direction proportionate to the wave.

These layers of sandstone furnish the finest flag stones in the county, being of any required thickness, and often twenty feet in length, and from five to ten in width.

The Tully limestone and the shale below disappear on Cayuga lake, four miles from Ithaca, the black shale extending about two miles farther south; and on the western side of the county, in consequence of the greater elevation of Seneca lake, the black shale disappears near the southern boundary of Seneca county, with the exception of a small portion rising above the lake, which results from the undulation farther south. The succeeding group of shales and sandstones approach the level of Seneca lake north of Hector falls, and Cayuga lake near its head.

The Ithaca group follows the rocks last described. Like the preceding, it consists of alternations of shale, both slaty and compact, and argillaceous sandstone, but differs from it in the contained fossils, and in some particulars of its lithological character. It sometimes contains thin layers of impure limestone, the calcareous matter arising principally from the contained shells. This group is well characterized in Ithaca, at the inclined plane of the rail-road; it extends also much above the rocks here visible, attaining a much greater thickness, as can be seen in the valley of Chemung, south of Seneca lake. In the rocks of this series, individuals of two species of ferns have been found, precursors of the great abundance of that tribe in the coal formation; and among the many testaceous fossils, are *Producta*, *Leptaena*, *Orthis*, *Pterinea*, &c. These diminish farther west; a few only of the more characteristic, occurring on Seneca lake.

With the deposition of the Tully limestone, the family of trilobites ceased to exist; yet we find with the characteristic fossils of this group, the buckler of *Dipleura Dekayi* and *Calymene bufo*, with other fossils which lived at the period of the deposition of the Moscow and Ludlowville shales. These fragments being the lighter part of the animal, were

floated upwards with the detritus of the lower rocks, and deposited at this era. Similar instances occur in some of the lower rocks; but the occurrence of such fossils is not to be considered as characteristic of a rock, or as evidence of their existence at the time of its deposition.

At Hector falls, and above, we find about four hundred feet of this group exposed; the lower part contains the ferns of Ithaca; and above, some of the other fossils. At this place, we find a few thick layers of sandstone, very compact and firm, which have been quarried by Mr. Lawrence. Few durable building stones are found in this county, if we except this sandstone, which however is little used. It furnishes the fine flagstones used in Ithaca, and elsewhere. In general characters it differs but little from that of the group below; but *Fucoides* are found in greater quantities on the surfaces; many stems of which attain a diameter of two or three inches. One species, the most abundant, occurs on the under side of the layers, as if growing on the bottom of mud and clay, when overwhelmed with the inundation of sand. This species is always straight or anastomosing at various angles; sometimes presenting imperfect reticulations, and at other times, a fancied resemblance to a bird's foot. It occurs on many layers, through a considerable extent, though separated by thick masses of shale. The surface of most of the layers is smooth, or even glazed with a thin coating of shale, which appears to have flowed over it, leaving marks of unequal deposition, and little ridges or prominences where the paste was less fluid. The deposition of these shales and sandstones progressed slowly, considerable time having elapsed between the deposition of the different layers; and in some instances a lower stratum became partially indurated before the succeeding deposit was made. There are numerous proofs of the general operation, and in particular of the latter, where we find, near Jefferson, the surface of a layer worn smooth and grooved, as if by a current, transporting some hard body over it. The scratches do not present the roughness of alluvial scratches, but appear to have been made before the rock was entirely indurated, or else they have been modified by the deposition of shale which succeeded. In this instance I have not been able to ascertain the direction of the current, though it was probably from the north, and like all other currents in the ancient seas, took the direction from the greatest elevations to the lowest point

In some localities the sandstone is replaced by a kind of sandy shale, being a mixture of sand and clay; and the whole is rippled, the markings affecting each thin layer, and showing that it was deposited from

water in motion which might transport from different directions the two materials of the rock. This group appears to have been deposited from an ocean alternately at rest, and disturbed. Thick masses of sandy shale occur, bearing ripple marks through their whole depth; these are succeeded by others of variable thickness, without ripple marks, and having the faces smooth and plain. Numerous alternations of this kind have been noticed through many hundred feet. Fossils never accompany the rippled layers, but are invariably found with the smooth. The materials of the two differ very slightly in mineral composition, the rippled ones being more sandy. The absence of fossils in the latter may be explained, by supposing the unquiet state of water during the deposition of the rippled shale to have been unfavorable to the development of organic life. So far as I have observed in this and other localities, the greatest accumulation of fossils is always accompanied by fewest ripple marks.

The changeful state of our planet at that period may have occasioned numerous risings and sinkings of the crust, some portions of which may have been disturbed oftener than others; one undergoing the oscillatory movement while another was at rest. This may be considered proved from the fact that undulations are exhibited in some localities, while a distance of a few miles shows a plane and undisturbed surface. Thus the undulations of the rocks on Seneca lake have not been communicated to those on the western shore of Crooked lake; although the latter are part of the same mass, separated only by a distance of ten or twelve miles. The valley of Crooked lake could have had no influence in interrupting the motive force, as probably at that time it was not excavated; and farther south we find other undulations of which the counterparts are exhibited on each side of the valley.

These uplifting movements would form bays, or protect certain portions of the sea where animals might exist in great numbers, while every other part for miles in extent, were too unquiet for the development or preservation of animal life.

In numerous localities of these rocks, the edges of strata, when exposed in ravines and other places, are found covered with crystals of sulphate of lime. This circumstance is by no means universal among the shales below, although observed in some localities; while in the present group there are few exceptions. Pyrites, in minute particles, is every where disseminated, decomposing on exposure, and hastening the destruction of the rocks; while the sulphuric acid combines with the mi-

nute proportion of lime which they contain, exhibiting the crystals along the edges. Wherever larger masses of pyrites occur, we find a proportionate increase in the quantity of sulphate of lime. Similar conditions in some of the limestones below have produced a mass of gypsum, filling the cavity previously occupied by the pyrites; and analogous circumstances, and varying in extent and effect, may have formed the vast gypsum beds of the same series, extending throughout the whole of Western New-York. The latter however could only have occurred before the entire induration of the surrounding rocks.

CHEMUNG COUNTY.

In this county, the group last described forms the surface rocks of the northern towns; and in the ravines and valleys, extends south to the southern line of the towns of Veteran and Catlin. The rocks here retain most of their essential characteristics; but fossil shells are exceedingly rare, and in many localities entirely wanting. The peculiar fucoidal markings are every where preserved in the thin layers of sandstone. The rocks of this group are well developed in Gulf creek, near Jefferson, at the head of Seneca lake; and at many points south on the west branch of the valley, and the ravines coming into it.

From Jefferson to Millport, the rocks dip south, exhibiting throughout continued alternations of shale and sandstone; and towards the upper part the compact shale is covered with fragments of a Fucoid, different from those below, and appearing only in curved fragments.

In the vicinity of Millport, and farther south, the sandstone layers attain a thickness of a foot or more, and are quarried for works on the canal and various other purposes; and at Pine valley, the sandy layers of the rock, are quarried in two places. Mr. Sexton, the owner of the last, informs me that the firmest layers of sandstone often pass into shale so as to be unfit for any economical purpose. This appears to be unlike the thinning out of the layer; but the proportion of argillaceous matter becomes so great that the mass crumbles on exposure.

At the last named quarry, I observed the singular fact of non-conformable strata, as yet the only instance noticed, and which various circumstances seem to render incredible. The strata are parts of the same mass, once continuous, the lower dipping south at an angle of four or five degrees, and the upper dipping north at about the same angle; and a short distance farther south the whole mass dips north. The only explanation that now offers, is that at the time the rocks were subjected

to the force which produced the undulations, the upper part slipped over the lower, and at this point partook of the elevation south; while the lower was affected only by the uplifting to the north. The point of the greatest depression is a short distance south of this locality. In this quarry was found the only specimen yet seen of a fern of the genus *Sphenopteris*; and through the liberality of Mr. Sexton, to whom I am farther indebted, I am enabled to place this specimen in the collection of the State. With the exception of the curved fragments of *Fucoides*, the upper part of this group is nearly destitute of fossils.

Chemung group. The tops of the hills and high grounds in the towns of Erin, Veteran, and Catlin, display a group of rocks and fossils very distinct from those last described. The essential difference is the lithological characters of the sandstone of this group in the absence of argillaceous matter in most of the layers, these being nearly a pure siliceous rock, harsh to the touch, and generally of a porous texture; while still a large proportion of the mass consists of compact shales and argillaceous sandstones of a softer texture than those below. The surface of the sandstone layers is rough, while those below are smooth and glossy, and being never rippled, prove that the rocks were deposited in a quiet sea.

A great variety of beautiful and characteristic fossils occur in the sandstone as well as the shale; many different from those of the group below, while several species exist in both. The principal ones are a species of *Delthyris*, the shell on each side extending into a wing, (*D. Alata*?) a *Leptæna*, *Orthis*, and a species of *Avicula* or *Pterinea*, ribbed like the common *Pecten*; besides several others of genera and species not before seen in the upper rocks.

The most northern extension of this group appears on the top of Buck mountain, near Millport, and on the high ground farther west; whence it is traced in the same direction to the valley of Port creek, on the western boundary of the county. The same rocks are found on the hills in Erin, and loose masses from above are scattered through all the low grounds hence to the Chemung river.

At about the latitude of Horseheads, in the northern part of the towns of Elmira, and Bigflatts, this lower portion of the Chemung group approaches nearly to the level of the valley. At Mayber's quarry, a mile and a half east of Horseheads, the rocks are quarried for the sandstone which is used for flagging, step stones, &c. These layers are highly siliceous and compact; and sometimes contain a few fossils. They alternate with thick masses of shale; often several layers of the former

separated by thin seams of the latter; and again, a thick mass of shale containing little silex and no sandstone. A similar quarry has been opened by Mr. Tuilegar, four or five miles east of Elmira; and here the layers are very uniform, from half an inch to two inches thick, and dividing by the vertical joints into slabs from six inches to two or three feet wide, and from four to six feet long. The sandstone contains a few species of *Orthis*, but the greater proportion of fossils are found in the shale. Wisner's quarry is near the junction of this group, with the Ithaca group below, or rather in the upper part of the latter, which appears at this point, the rocks rising southward from Horseheads to the Chemung river.

The rocks of this group, containing an abundance of fossils, occur on a small creek coming into the Chemung valley from the northwest, and also on the Sing Sing creek, passing through Bigflatts. On the south side of the Chemung river, in Southport, the banks of the valley exhibit the rocks of this group with their peculiar fossils.

Between Elmira and Chemung they are seen at numerous points, but no where in the county so well as at the Chemung upper narrows, about eleven miles below Elmira. Here the excavation for the road along the margin of the river has exposed more than 100 feet of rocks, containing abundance of the characteristic fossils, and in their greatest beauty and perfection. At a certain point in the mass exposed, we find a peculiar coralline fossil, confined to a thin stratum, and extending along the whole distance of the exposed rocks; it has also been found at other localities.

The mountain above the rocks exposed, at Chemung narrows, rises 400 or 500 feet, and is probably capped, as some of the hills in the neighborhood, by the conglomerate, which is the limit of the Chemung group upward. Farther south, near Tioga point, rocks of the same group occur in the bank from 100 to 200 feet above the river, and some of the sandstone layers are 3 or 4 feet thick, and highly silicious. I was informed that on the top of the hill the conglomerate is quarried for use on some of the public works below Tioga point.

At the Chemung upper narrows, and at several other localities, there occurs in this group a stratum of concretionary sandstone of a peculiar character. In a few instances only are the concretions perfectly formed, but generally have one side imperfect, with a solid nucleus partially surrounded with concentric laminæ, which easily separate from each

other; these are used for water vessels, &c. the concavity being often so great as to contain several gallons.

In the valley of Cayuta creek the group is exposed in a ravine three miles north of Factoryville, where fine flag stones could easily be obtained. In the north part of Barton are great numbers of loose masses containing the fossils of this group, probably washed down from the tops of the hills in the vicinity.

A group so characteristic and so well defined in the valley, and particularly in the town of Chemung, merits the appellation of the Chemung group.

The topography of this county is very simple; the Chemung river passes through the southwestern part of the county, and opens a broad and beautiful valley, bounded by a range of hills which are only broken by the lateral streams flowing to the river; the rocks on one side sometimes approach the river, while on the opposite is an extensive flat or bottom. Here, as elsewhere, the rocks on both sides of the valley bear evidence of erosion, and show that this river, as well as other streams, flows in a bed once occupied by rocks like those of the mountain mass.

The eastern boundary of the county is along the valley of Cayuta creek, which has its origin in the small Cayuta lake, in the north part of the county, and forms a continuous valley thence to the Chemung river. Wynkoop's and Baldwin's creek form valleys of less importance.

The Chemung valley, extending from the head of Seneca lake to the Chemung river, is the most prominent feature in the county. It offers the only route by which a canal could have been constructed, being through its whole extent alluvial, and presenting no remarkable elevations. The ascent from Seneca lake to the summit level of this canal, is 440 feet in a distance of fifteen miles.

STEBEN COUNTY.

The examinations in Steben county during the past season, were principally confined to the eastern and southern part, along the valleys of the Chemung, Canisteo and Conhocton rivers, the valley of Crooked lake, &c.; and beyond this, some other points of interest, with one or two reputed localities of coal, which prove like all others of the same kind, a fruitless enterprise.

The rocks of that part of the county examined, belong principally to the Ithaca and Chemung groups, varying in some slight degree from these groups farther east. Along the western shore of Crooked lake they consist chiefly of sandy and slaty, or argillaceous shale, the former rippled or undulated, showing that each thin layer of the shale was subjected to the action producing the rippled surfaces, and this action continued uniform throughout the whole deposit. Alternating with the greenish shale just noticed, is a darker slaty shale containing fossils. At some localities occur a few thin layers of sandstone, but these are not abundant until we approach the head of the lake.

Four miles below Hammondsport, in a ravine on the bank of the lake, can be seen a concretionary stratum of impure limestone, composed of roundish or irregular masses cemented together by an argillo-calcareous cement. In other localities, the concretionary forms are not so distinct, and the whole bears the character of an irregular mass, separated in various directions by thin seams of shaly matter. So far as examined, this mass bears a very uniform and constant character; it disappears beneath the lake on the east side, one mile below Hammondsport. This limestone has been burned, but found too impure for quick lime, though it possesses some of the characters of water lime.

At Hammondsport, in the ravine above Mallory's mill, we find about three hundred feet of rocks exposed, belonging to the Ithaca group; they are well characterized by the *fucoides* resembling a bird's foot. Few fossils other than *fucoides* appear through this thickness, though higher in the ravine, are some fossils peculiar to the group. The mass exposed consists, in the lower part, principally of shale and thin layers of sandstone, and at a higher point numerous layers of sandstone from four to ten inches thick. The edges of all the layers exposed, are covered with crystals of selenite, or crystallized gypsum.

About one mile from the mouth of this ravine, an excavation for coal has been made in the black shale, which alternates with the sandstone and olive shale. The indications of coal at this point were a few fragments of vegetables, iron pyrites, and the odor of bitumen arising from the shale; all these were supposed to be unfailing evidences of coal beneath. The work is at present abandoned until some new excitement or reported exhibition of burning gas, shall induce others to engage in the enterprise. In the shale thrown from this digging, I found *Inoceramus*, *Ptenirea* and several other fossils.

On the east side of the valley, opposite Hammondsport, a similar ravine exposes the same strata as those just described.

Similar exhibitions of the rocky strata occur in the deep ravines between Hammondsport and Bath, and also in the high hills about the latter place. About four miles north of that place, we find the rocks and fossils of the Chemung group. One mile northwest of Bath occurs a stratum of very tough argillo-calcareous rock, three feet thick; the mass is filled with fragments of crinoidal columns, presenting surfaces like the finest birdseye marble. Should the rock be of such a quality as to receive a fine polish, it will be a valuable acquisition to the mineral wealth of the county. A large species of *Leptæna* and *Delthyris* occur in the lower part of the mass.

The rocks of the Chemung group continue along the valley of the Conhocton to Painted-Post, and as far up the Tioga as the south line of the State, the tops of the high hills excepted, which are capped by the conglomerate in a few places.

The valley of the Canisteo is bounded on both sides by almost unbroken ranges of rocks of the same group.

The same rocks are seen along the valley of Five-mile creek, and also those of the Ithaca group. This valley appears to have been formerly a continuation of the Canandaigua lake valley, and the communication between that valley and the Conhocton.

The soil of Steuben, though not as favorable for the production of grain as the northern counties, is one of the best sections for grazing. From the valleys, the high country seems broken and uneven; but this is confined to the immediate edges of the hills, for after ascending the table land, we find a beautiful undulating surface, which when farther cultivated and cleared of forests, will prove one of the best grass-growing regions in the State. These remarks apply also to Chemung county; and in all the elevated portions of both, the water is pure and soft.

The facilities for communication in this county are very great, and when the New-York and Erie rail-road shall be completed, the lateral valleys will afford thoroughfares from all parts of the county. Uneven as its surface is represented, the valleys of the Conhocton, Canisteo, Tioga, Five-mile creek, and numerous others, furnish means of establishing smooth and permanent roads from almost every part of the county.

WAYNE COUNTY.

The re-examinations in Wayne county were made with a view of ascertaining some facts in relation to the iron ore which is known at different points along the whole length of the county. This ore and the

associated rocks being members of the Protean group, we might have expected, what we actually find, a great variation and obscurity in the character of the rocks at different points.

From some observations in the adjoining county of Cayuga, I was led to suppose that there existed two beds of ore, and that the different localities might be in different beds. My examinations were chiefly directed to this end, knowing that three successive beds occur in this group farther east. The locality known as the Wolcott ore bed, in the eastern part of the town, is the one best known, and from which the greatest quantity of ore has been extracted. The ore at this place is about three feet thick, and where worked is covered with a thick deposit of clay, the superincumbent rock having been removed; a little distance from this place, we find a thin mass of shale covering the ore. From these circumstances, and the fact that no rocks are visible below the ore, it being but a few feet above a swamp which communicates with the lake, my examinations were difficult and not entirely satisfactory. It appears, however, that this bed is immediately below the Rochester shale, while the bed of ore at Rochester, Ontario, and other places, is separated from the same shale by forty or fifty feet of rocks, being below the *Pentamerus* limestone.

At Wolcott furnace, the thin bed there known and worked some time since, holds the same position, being directly beneath the Rochester shale, and above the mass of crinoidal limestone which limits the upper green shale. Were any other bed of ore below, it could not be seen at this point, as it would be below the level of the lake. The *Pentamerus* limestone which uniformly holds the same position, is found in a creek half a mile northeast of the furnace; and the same rock was found in digging for a salt spring on the creek below the furnace.

Four miles west of Wolcott the *Pentamerus* limestone is found, in a creek at Whiting's mill; the shale below is green, with a thin included mass of purple shale. No iron ore is visible at this place below the *Pentamerus* limestone; and above it could not be examined in consequence of a pond of water. The great accumulation of alluvial about the bays and inlets of Lake Ontario, seriously interferes in examinations of this kind.

The next point west where these rocks are visible, is at the former Shaker settlement, near Sodus point; the stream running into a small bay at the lake, has exposed the *Pentamerus* limestone with the shale above and below. The limestone is here twelve feet thick, and below

it covers the green shale, including a thin mass of purple or chocolate colored shale. The green shale below the purple includes some wedge-shaped masses of crinoidal limestone, which have apparently taken this form in consequence of the insufficiency of the material to form a continuous stratum at the time of its deposition; the masses do not all hold the same place, appearing as if they had been infiltrated from above, some finding lower levels than others.

Above the *Pentamerus* limestone we find again green shale, not much dissimilar to that below. This mass is twenty or thirty feet thick, and succeeded by a mass of encrinal limestone in thin layers, which is the constant associate of the upper green shale, and separates it from the Rochester shale. Associated with this encrinal limestone, is a bed of iron ore, the thickness of which we could not ascertain at this place without excavation, which was not made. This bed corresponds in position with that at Wolcott furnace, and also with that in the eastern part of the town, from which ore is obtained for the supply of the Wolcott furnace.

The only indication of iron ore below the *Pentamerus* limestone, is the purple shale which has probably been colored by infiltration of iron from above. This shale occupies nearly the same position as the stratum of ore at Rochester, and the western part of Wayne county; this difference of position was probably produced while the whole mass was in a fluid state, by the iron passing through some of the strata, and forming beds upon others which were impermeable. With this view of its formation, it is not surprising that we should sometimes have one and sometimes two beds, and that their position in the rock should be variable, higher or lower in one place than another.

Farther west we have evidence in favor of the hypothesis just advanced. At Cental's mill near Sodus bay, the ore occurs in several places, and particularly on the creek above the mill. The ore at this place is intermixed with the *Pentamerus* limestone, and replaces the lower strata of that rock. The green shale below is but two or three feet thick, the sandstone being visible at the same place. The purple shale noticed at the two last localities, is no where to be seen. Here then we find the ore to have changed its place, and to have formed a bed below the *Pentamerus* limestone. At the other localities, the purple shale may be considered as the representative of the iron ore stratum; while a sufficient quantity did not pass the superincumbent strata to form a bed of the ore, some of the finer, almost soluble, particles penetrated and colored the rock. But at Cental's mill and west of it, the whole

mass of ore has passed to about the position held by the purple shale at the Shakers' mill.

At the latter place, and at several localities farther west, no indications of ore could be discovered in the position of that first mentioned, or immediately below the Rochester shale. The mass at Cental's mill holds the same place as that at Ontario, Rochester, and other places where it has been observed.

I have ascertained by this examination, that the ore bed occupies two positions, one above and the other below the pentamerus limestone. The lower bed extends from Cental's mill westward to the Genesee river; and the upper bed from near Sodus bay to the eastern limit of the county. Thus far, I have not been able to ascertain the existence of the ore below the pentamerus limestone throughout this distance, though there are some indications of it in one or two places. From the situation of the rocks being near the lake level, boring would be required to ascertain the fact.

The facts relating to this ore, and the rocks of the group containing it, will be given more in detail hereafter.

In this examination, several fossils have been added to those already collected in Wayne county, and which may perhaps serve to identify these rocks hereafter. Among them is the Graptolite,* which occurs abundantly in the green shale above the pentamerus limestone, at the Shakers' mill. It is also found farther west, and one or two specimens have been seen in the same shale at Rochester, which is there characterized by the *Agnostis pisiformis*.

Alluvium. All the counties examined are more or less covered with alluvial deposits, which in some places merely form a thin covering of the subjacent rocks, and in others rise into hills or fill deep valleys, caused by the removal of rocky strata. The more elevated parts of the southern counties exhibit least of this deposit, while the northern ones are in many places deeply covered.

It is often difficult for the student in Geology to conceive of water flowing over the surface of a country so much elevated above the sea;

* The Graptolite has been found in fine bituminous shale in Norway and Sweden, in rocks of the same age as those of Western New-York; those found in Wayne county nearly resemble the figure of this fossil given by Mr. Lyell, in his Elements. "These bodies are supposed by Dr. Beck, of Copenhagen, to be fossil Zoophytes, related to the family of sea pens, of which the living animals inhabit mud and slimy sediment." See Lyell, *Elements of Geology*, page 462.

and more difficult to conceive how it could transport such immense quantities of fragments. Before the doctrine was admitted that vast portions of land have suffered elevation and subsidence by gradual process, or by sudden and repeated shocks, these effects were all referred to a deluge; and the ancient alluvium has by most authors been termed diluvium. But since the experience of the last century has demonstrated that large continental areas are in some places sinking and in others rising, it is easy to comprehend that any portion of a country may have been subjected to such action at a time when it was perhaps at even a lower level than that of the sea.

It is probable that at an early period, by the elevation of the primary ranges of New-England and New-York, the interior of our country extending far to the west, became a lake or estuary. Some subsequent cause, perhaps the elevation of a portion of country in Canada, which raised all the strata of Western New-York, produced a current to the south. Other agencies may have been in operation to break up the strata in the region of Lake Ontario, which were besides of such a nature that water would soon remove a great portion of the rocks once occupying this area.

The northern parts of Ontario and Seneca counties, along the line of the Onondaga Saliferous group, are for the most part covered with deep alluvium, rising into hills of greater or less elevation. In the western part of Ontario these are very irregular in form and arrangement, and appear as if produced by the eddy of a great current flowing from north to south: hills of the same character extend westward to Genesee river. Unlike most of the alluvial hills farther east, they contain, mixed with pebbles and boulders from the north, masses from strata immediately beneath: these present rounded and smooth surfaces, showing that they have been in motion, though not far removed from the parent rock.

The upland country north of Seneca-Falls and through Wayne county, exhibits a series of parallel ridges extending N 10° E, and so uniform that a line in this direction may be seen on the very summit for a long distance. From the south the rise is very gradual to near their northern termination, which is an abrupt descent; while alternating with them may be seen the commencement of similar ridges, which continue their course for a quarter or half a mile, to be succeeded by others. Thus, in crossing the country east or west, we are constantly ascending and descending, now the high northern terminations, and again the low southern extremities. Some of these ridges are long and low, rising to

a height of no more than twenty feet; the summits of others are fifty, sixty, or even a hundred feet above the general surface. They are composed of sand, which usually forms the covering of the whole, and gravel and pebbles from the rocks north; as the green sandstone of Salmon river, and the red sandstone bordering Lake Ontario.

The abrupt northern and the gradual southern slope of the ridges, together with the materials of northern origin, prove the course of the current. Their bearing here is uniform, and in the direction of Cayuga and Seneca lakes, through whose valleys the accumulated waters found a passage southward. The irregularity of these hills farther west, doubtless resulted from obstructions offered to the course of the current, by the more elevated part of the limestone terrace.

The first or lowest alluvion which has been recognized, is a dark coloured gravel,* generally containing in the middle range of counties, abundance of pebbles of dark limestone, a character however which varies with the distance from the rock; the greatest proportion of pebbles of any rock being within a limited distance south of the mass in place. The last deposit is variable in composition, but of finer materials than the first, and is always known by a reddish tinge derived from the destruction of the red shale of the Onondaga saliferous group. This colour distinguishes the soil for twenty or thirty miles south of the original rock, decreasing in intensity with the distance. The general character of this red soil is a clayey gravel, but varies from intermixture with materials from beneath and disintegrated rocks; and at some points, the removal of this soil since its deposition has exposed the dark gravel below.

The lower alluvion is less strongly marked in the southern counties; here it occurs mostly in ancient water courses. The great valleys partake largely of its character, and pebbles from the limestone and other northern rocks are found abundantly in the valley of the Chemung river, and on the southern border of the State. The valley south from Seneca lake is a well characterized example, the gravel being composed principally of northern rocks, and much worn and reduced in its progress southward. The upper alluvion of the southern counties is beyond the influence of the red shale, and does not present its distinguishing colour.

* In the Third District Mr. Vanuxem finds below this a deposit of sand; which doubtless will also be found in the Fourth District.

Clay. This deposit is extensively distributed in the valleys and low grounds of the counties examined. The valleys between the ridges in the north part of Ontario and Seneca counties are clay, with sometimes a slight admixture of other ingredients. The destruction of northern portions of the Onondaga saliferous group has doubtless given rise to a large proportion of the clay, which from remaining longer suspended in the water was deposited upon all the other materials. Bricks made from this substance are usually of a light colour, and from the large admixture of calcareous matter are of inferior quality; though to many beds of clay this objection does not apply.

Boulders of granite, gneiss and other ancient rocks are scattered upon the surface or imbedded in the soil. Besides these are fragments of limestone and some other rocks of the district; as of the Tully limestone in the valley south of Seneca lake. One of these masses is fifty feet square and six feet thick. Numerous others are found of less dimensions, which furnish lime for the country around. These have scarcely been worn by attrition, but present the appearance of fragments just removed from the parent rock, while their nearest locality is from thirty to forty miles. Fragments of the conglomerate above the Chemung group occur in many of the valleys; these bear evidence of attrition, and have probably been derived from the tops of the neighbouring hills.

Upon the lands of the Messrs. Lawrence, in the valley on either side of Cayuga lake, are several large angular masses of rock, differing from any seen before in the district either in place or otherwise. Some of these have the colour of red sandstone, approaching to that of red jasper; others are nearly white, with veins and irregular spots of red; the rock is exceedingly hard and tough, presenting an uneven fracture. It effervesces slightly with acids. From comparison, it proves to be the same with the altered silicious limestone described by Prof. Emmons, as resting on the slate at Burlington, and doubtless equivalent to all the limestone of the western part of Massachusetts, usually termed primitive. A circumstance very remarkable is that none of these fragments have heretofore been observed, the present being more than 250 miles from the nearest locality of the rock.

Lake Marl and Tufa are very abundantly distributed over many parts of the counties examined, and are already becoming useful both for lime and agricultural purposes. Along the line of the saliferous group, these substances are abundant, arising from the decomposition of the

soft gypseous marl. In the southern counties they are in more profusion than in the limestone districts, thus proving the alluvial origin of marl in these places; for if it resulted from the decomposition of limestone in place, it would be found in those regions most abundantly; which is not so. The alluvium contains a large quantity of calcareous matter, as is evidenced by the gravel being cemented by it in many places, forming a coarse conglomerate; and in others, the pebbles are covered with a deposit of the same material. The percolation of water through these immense piles of alluvium results in the solution, and afterwards the deposition of the calcareous particles; forming when deposited under water the fine pulverulent lake marl, and when exposed to the atmosphere, the porous substance called tufa.

In many places where these materials exist in abundance, limestone is brought from a great distance and burned for lime, while the marl, which is equal if not superior, remains in the bog. Thus at points distant from limestone quarries, the cost of lime greatly exceeds that for which it might be obtained from materials on the spot. I am not able to state the exact amount in loads or bushels, but am quite sure that the deposits of marl in the southern counties, are sufficient to supply the demand for lime and other purposes for an indefinite period.

There are several localities of marl in Seneca county; one of these is in the north part of Varick, about a mile from the lake shore. Near the village of Ovid, on Mr. Dunlap's farm, are several beds of marl; one of them, covering four or five acres, has been penetrated four feet, below which point it becomes sandy. It has been used both for lime and for agricultural purposes, in its present state. For the latter Mr. Dunlap considers it very beneficial; and a dressing of marl produces perceptible effects on the crops for many years afterwards. The marl at this place is a deposit from springs which have their source near the summit of the hill east.

The Cayuga marshes, embracing an area of forty thousand acres, are in many, and probably all, places underlaid by marl to the depth of several feet. This immense deposit contains far more than all known in the fourth district besides; and when the marshes are drained, as doubtless they will be eventually, this material will furnish lime and manure for an extensive district of country.

Some notice of the attempt to drain these marshes, was given in the report of last year; but so long as the lakes retain their present elevation, and are subjected to annual floods, such a plan, as the one pro-

posed, cannot be effectual. A more feasible one would be to confine the water flowing from the two lakes to a channel of sufficient width, by walling or embankments, and to conduct all minor streams through the marshes in the same manner, or by ditches cut for the purpose, where several could be joined in one. Ditches should also be constructed along the margin of the marshes, so that all water rising from springs in the upland or other sources, could be conducted into them, the whole communicating with an outlet at a lower level than the surface of the marsh. By this means there would be no more water on the surface than that produced by rain or snow; and the present water on the marsh, with any surplus which might arise afterwards, could be removed by several windmills, working pumps placed in different parts of the marsh. This plan would doubtless be an effectual one for draining many marshes which are now entirely waste, and is possibly worthy the attention of those who wish to deepen the outlet, and thus effect a lowering of the lakes by several feet.

In the north part of Ontario county, along the range of the saliferous group are extensive deposits of marl, but none of them that I am aware have been much examined. South of the village of Bethel, along the valley of Flint creek, there is an extensive deposit of lake marl, extending for several miles in length, and from half a mile to one mile wide. The whole area is now a cedar swamp, and the fall in the stream so gradual, that there is no means of drainage except by an embankment along the stream, and ditches cut through the swamp; which would be amply repaid by the reclamation of a valuable tract of land, and an inexhaustible supply of material for lime; besides improving the healthfulness of the situation.

South of Naples, and near the head of Canandaigua lake, are several beds of marl, which have not been much explored.

In Tompkins county, in the south part of Hector, there is a very extensive bed of marl on the land of Mr. Petrie; it embraces an area of more than six acres, being of variable depth, from a few inches to more than twelve feet. At Reynoldsville are several beds, all in the same valley; from one of these two thousand bushels of lime are burned annually. On the land of Abraham Wood, six miles from Ithaca, there are several beds; and others near Newfield.

In Chemung county several beds have been noticed near Millport, and the water flowing through the soil and rising from springs, is so highly impregnated with lime, that on standing a few hours, while the

carbonic acid escapes, a thin deposit of calcareous matter is observed. A deposit has been discovered on the farm of Mr. Lyon, two miles northeast of Johnson's settlement. In the town of Dix, at the Beaver-dam, there is an extensive bed of marl, which has been burned for lime; it is cut into blocks, dried, and then laid in the kiln for burning. Another extensive bed occurs on the farm of Mr. Lounsbury, near Horse-heads. The two last named beds contain large numbers of shells, of the genus *Helix*, *Paludina*, *Planorbis*, *Trivolva* and *Cyclas*.

Four miles north of Bath, at Townshend's mill, there is an extensive bed of marl and tufa; the whole is a deposit from a copious spring which supplies the hydraulic power of the mill. The marl is much mixed with loam and clay, and is unfit for lime, except that used for agricultural purposes. The tufa could be advantageously burned for lime, in a region where this substance is transported thirty or forty miles.

Bog iron ore occurs in numerous localities, but in so small quantities as to be of little value. It is usually found at the outlet of swamps, or low grounds covered with vegetable matter, the decomposition of which furnishes carbonic acid to the iron in the soil below, thus rendering it soluble in water. To this cause is owing the whiteness of sand and gravel below mucky grounds, the iron, which was the colouring matter, having been dissolved and removed.

Water and Springs. Throughout the greater part of the district examined, water is easily obtained, and springs are abundant. In some places in the north part of Ontario and Seneca counties, where the alluvium is of great depth, some difficulty occurs in obtaining a sufficient supply. Where only the ordinary depth of alluvial occurs, springs rise to the surface at frequent intervals. Almost all the water is charged with calcareous matter; and deposits, often minute, occur in most of the streams or springs. In the southern part of the district, the streams which rise on the hills are pure, but after passing through the alluvium, they are charged with calcareous matter, or become hard water.

Hydrosulphuretted springs are numerous, particularly along the range of shales above the Seneca limestone; and also in the water lime group. Several springs of this kind were noticed in Seneca county, but none of them copious. The most remarkable one occurs in the eastern part of Manchester, on the road from Vienna to Canandaigua; the odor of the gas is perceptible at the distance of a quarter of a mile. The water issues from several points at considerable distances from each other, but all at about the same elevation in the rock. Two or three

of these springs were dry at the time I visited the place, and the pebbles in the course of their outlet were covered with a deposition of sulphur. Some of the springs were flowing copiously, and one more than all the others, the quantity of water discharged being much greater than from any other spring of the kind I have ever seen, and the whole strongly impregnated with the gas. Calcareous deposits of considerable thickness are forming about the springs; these are covered with an incrustation of sulphur, as also the stones, grass and moss about the spring and along the outlet.

The spring at Canoga, from which nitrogen is emitted, has already been mentioned under Seneca county.

At Townshend's mill, four miles north of Bath, noticed as a locality of marl, there are several copious springs. These springs are the source of the inlet of Crooked Lake, and in dry seasons afford more water than from all the other streams flowing into it.

Saline efflorescences are of common occurrence on the exposed surfaces and cliffs of the upper black shale, and of the group above. These efflorescences are principally of sulphate of alumine and magnesia, but in many instances, muriate of soda or common salt occurs, and in such quantities as to produce brackish springs. These circumstances are, however, no evidence of a large quantity of the material, but only of its presence, which we might expect from the conditions under which these rocks were deposited. The largest proportion of the rock being shale, deposited from an ocean in the form of clay, which from its nature remains long suspended in water, would carry with it, during its slow deposition, some portion of the saline ingredients of that fluid. The saline matter, as the clay consolidated, became part of the rock, which now disintegrating by the action of water, the saline matter is dissolved, giving its character to springs, or appearing in efflorescences upon the exposed surfaces.

The numerous deer licks which occur in this region, derive their saline ingredients from the same source. At Jefferson, head of Seneca lake, there is a spring of this character; it is about two hundred and fifty feet above the lake. The pebbles along the stream which flows from the spring, are often in dry weather covered with particles of salt. At some distance below the spring, is a deposit of ochery iron, which impregnates the soil for some distance from the stream; this deposit has nearly disappeared, as the water from the spring is but slightly impregnated with this mineral. Saline springs are said to have been found

in the margin of the large marsh or swamp at the head of Seneca lake, and Mr. Quin has obtained salt from the water by evaporation. Of these and similar indications of salt water, we may confidently say that they should encourage no expenditure in digging or boring, as the quantity of salt obtained will be too small to repay even the least labor or expense.

Carburetted hydrogen. This gas, frequently accompanied by bituminous matter, rises in many springs and streams, also in ponds and stagnant waters, as well as in places where water is not present. Surface water, indeed, has no connection with the phenomenon, any more than to indicate the presence of the gas in its passage upward, by the bubbling produced. The term carburetted hydrogen springs cannot, therefore, be used with the same propriety as sulphuretted hydrogen springs, for in the latter case the gas combines with the water, while in the former it does not. The occurrence of this gas is observed over a great extent of country, particularly in the black shale from Cayuga lake to Lake Erie. It sometimes appears to be connected with fissures or rents, whether the cause producing the latter has any influence in the production of the gas, we are unable to say. In one place on the outlet of Crooked lake, this gas is emitted in a line extending NW and SE, for the distance of several rods. The line of bubbles was traced diagonally across the canal, and from thence several rods distant across the outlet, and I was informed that at some distance SE, where a digging had been made, the gas was perceived issuing in the same line. The gas escapes in several other places in the vicinity, though there was no means of ascertaining the direction. The course here noticed is not that of the joints occurring in this rock, and may probably be connected with a fault or dislocation of the strata, as there is a slight depression of the rocks not far from this point.

In Yates county, in the town of Middlesex, one mile and a half from Rushville, this gas issues in large quantities from the soil; an excavation to considerable depth has been made, and a large volume of gas now escapes from the water, and also from a small spring near. The quantity of gas is sufficient to supply a constant flame from the entire surface of the spring. It was formerly used for warming and lighting a house near the spot, but has been for a long time neglected.

In Ontario county, near Goodwin's tavern in Bristol, there is a copious emission of this gas, and also on the opposite side of the valley. In Cheshire, five miles east of the last place, there are several localities;

jets of gas issue from small fissures in the rock, and when ignited, present a beautiful appearance. In Manchester, on the east side of Canandaigua lake, this gas escapes in much the largest quantities, and in the greatest number of places, and its occurrence is manifested more or less for considerable distance along the same range. Several years since, a practical imposter persuaded the owner of the land at this place that the escape of this gas indicated silver beneath the surface, from some decomposition or chemical change, of which this gas was liberated. The small particles and nodular aggregations of pyrites found in the rock, was also considered a proof of its existence. A boring was first commenced, which was followed by an excavation to the depth of more than fifty feet, when the work was abandoned. The earth around the openings where the gas issues, is of a dark colour, and no vegetable will grow near them, owing to the large quantity of pyrites, whose decomposition producing copperas, blackens the soil, and destroys vegetation.

Depth of Lakes. At present, we will merely state the depth of those lakes known, the various opinions regarding them being very erroneous, as we were often informed that some of these lakes were fathomless. Lake Ontario is stated to be 492 feet deep: from soundings made in Seneca lake, the greatest depth ascertained was 530 feet, and of Cayuga lake 400. Crooked lake has not been examined in the deepest part, the soundings made gave a depth of about 200 feet, and 270 feet is said to have been reached in one part. The surface of this lake is 280 feet above that of Seneca lake.

Cayuga and Seneca lakes are situated in the midst of soft shales, and from being the principal channel of the great northern current, have their beds worn much deeper than the other north and south lakes.

During the past season, I have been assisted by Mr. E. N. Hosford and Mr. E. S. Carr; and I have much pleasure in bearing testimony to the faithful manner in which both these gentlemen have discharged the duties assigned them.

Our obligations are due to the inhabitants generally, and in particular to Judge De Mott and Halsey, and Mr. Nexsen, of Seneca, to Dr. Deane and Mr. Johnson, of Ontario, and to Capt. Dakin, of the steam-boat Richard Stevens, Dr. Sartwell, of Yates, Mr. Suffern, of Chemung, Mr. Leland and Mr. Pratt, of Steuben, and Mr. Duncan, of Wayne.

Of specimens illustrating the Geology and Palæontology of the Fourth District, twenty-five boxes have been deposited in the Geological rooms at the Capitol.

JAMES HALL,
State Geologist.

Note.—In the statement of the counties comprising the Fourth District, made in the report of last year, the names of Steuben, Allegany, Cattaraugus and Chautauque were omitted.

ERRATUM.

On page 6, line 22, for "Meteorological," read "Mineralogical."

GLOSSARY OF TECHNICAL TERMS

Alluvium. A recent deposit of earth, sand, gravel, peat, &c.; the term is applied to depositions which are now accumulating, as at the mouths of rivers, &c.

Alum rocks. Rocks which, by decomposition, form *alum*.

Amorphous. Bodies devoid of a regular form.

Amygdaloid. A rock more or less cellular in its structure, and at the same time abounding in cavities in the shape of an almond. It is one of the class usually called Trap rocks.

Anticlinal axis, ridge, &c. The line from which the strata of any formation dip in two directions, like the roof of a house.

Augite. A simple mineral of variable colours, passing from white through gray, green and black of different shades. It is a constituent of many volcanic and trappean rocks, limestone, granite, &c.

Basalt. A black or grayish black compact rock occurring frequently in a columnar form, as at the Giant's Causeway in Ireland. Many geologists consider it to have been formed by the fusion of augitic and feldspathic rocks under great pressure, as at the bottom of an ocean or deep sea; hence its compact structure.

Basin. Deposits lying in a hollow or trough-shaped excavation, are said to occupy basins.

Bed. A mass of mineral matter lying between the layers or strata of any rock.

Bitumen, bituminous, &c. An inflammable substance which presents itself under two forms, a solid and liquid; when in the former state, it is called *asphaltum*. In its liquid state it is like tar. Seneca oil is an example of it. Coals, slates, limestones are often bituminous.

Blende. A German name for sulphuret of zinc.

Boulders. Rocks which have been transported some distance from their original beds; they are more or less rounded by attrition and the action of the weather.

Botryoidal. Resembling in form a bunch of grapes.

Breccia. A rock or portion of a rock composed of angular fragments, cemented together by lime, iron, or some other substance.

Calcareous spar, is crystallized carbonate of lime.

Calc sinter. A deposition of porous carbonate of lime, from the waters of mineral springs.

Carbon. A simple substance, known in a pure state in the diamond only. It is one of the combustible elements in coal.

Calciferosus. Bearing or containing lime.

Carbonates. Compounds formed by the union of carbonic acid and a base.

Carbonic acid. An acid gaseous compound composed of carbon and oxygen. It is incapable of supporting combustion, and deleterious to animal life. It is heavier than atmospheric air; and hence is found

at the bottom of wells, cisterns or caves. Its presence may always be known by letting down a candle, by which it will be extinguished; a precaution which should always be observed previous to descending into them. A person is rendered entirely incapable of exerting himself the moment he inhales this substance, and of course cannot extricate himself when immersed in it.

Carboniferous. Coal-bearing.

Chloride. A combination of chlorine and a base, as sodium, which, in chemical language, is called a *chloride of sodium*; in common language, it is dry sea salt.

Chert. A silicious mineral resembling flint, hornstone, &c. Rocks containing it, are called *cherty*.

Chlorite. A soft greenish mineral composed of minute scales closely compacted together. It differs very little from soapstone. Rocks containing it, are said to be *chloritic*.

Clinkstone. A rock allied to basalt, which rings when struck.

Cleavage, is the separation of the lamina of rocks or simple minerals in certain constant directions. In rocks, it is not always parallel to the planes of stratification; and hence the planes of cleavage may be mistaken for those of stratification, and vice versa.

Coal measures, coal formation. Rocks containing coal.

Conformable. The arrangement of the strata of two rocks in parallel position.

Conglomerate. Masses of rounded stone, gravel and dirt, cemented together.

Cretaceous. Belonging to the chalk formation.

Crop out, and out crop. Emergence of a stratum or a rock from the soil, or from the adjacent strata or rocks; in other words, its appearance at the surface.

Crystal, crystalline. A geometrical solid; the latter, an assemblage of imperfectly defined crystals.

Crustacea. Animals having a thin coating or crust, like the lobster, which they shed periodically.

Delta. Alluvial lands formed near the mouths of rivers, of a triangular shape, and included between the branches of the river and the sea-shore. Large rivers, just before their entrance into the sea, frequently divide into several branches; this division is in consequence of the earthy matter borne down by the river to its junction with tide water, where it is deposited, forming thereby banks of sediment which rise in time above the water.

Denudation. A term used to express the removal of sedimentary matter from any area. Rocks from which any covering has been swept off by currents of water, are said to be denuded. Valleys are sometimes formed in this way; they are then called *valleys of denudation*.

Deoxidized. Deprived of oxygen.

Dicotyledonous. One of the grand divisions of the vegetable kingdom, founded on the form and structure of the seed, which, as the name expresses, has two seed lobes.

Diluvium. An accumulation of loose sand and gravel, and other materials, which some geologists suppose to have been collected or spread over a district by the action of a deluge.

Dip. The angle which a stratum or series of strata make with the plane of the horizon. The *direction of dip*, is the point of compass towards which the strata sink or plunge, and the *angle of dip*, is the amount in degrees which the planes of the strata make with the plane of the horizon.

Dislocation. A lateral or vertical displacement of a vein, stratum or series of strata, destroying thereby the coincidence of the planes of stratification in the same formation, and breaking the continuity of veins, dykes, &c.

Dolerite, one of the trap rocks, composed of feldspar and augite.

Dolomite, a magnesian carbonate of lime.

Drift, a horizontal passage into a mine.

Dunes or downs. Sand raised into hills and drifts by the wind.

Dykes or dikes. Veins of stony or rocky matter, belonging to the unstratified class, as granite, greenstone, lava, &c. which intersect the strata or cut through them, and generally approaching to verticality. It is a Scottish term for *wall*, as the dyke often projects upward above the strata in the form of a wall. The materials forming a dyke, are supposed to have been injected in a melted state from beneath, into cracks and fissures which have been formed by the drying of the earth's surface, or by convulsions of a more powerful kind, as earthquakes.

Earth's crust. The superficial parts of the earth's surface, which are accessible to observation.

Eocene. An era or period which commenced with the present order of things, applied with particular reference to the animate creation; it signifies *dawn*.

Estuary. An inlet of the sea towards the land. The extent is confined to the limits of salt water, or the area in which fresh and salt water mingle.

Exuvie. Fossil remains of animals.

Fault. Displacement of veins, dykes and strata commencing first in their fracture and ending in their removal in some direction by which the continuity of their planes is destroyed. See *Dislocation*.

Feldspar, one of the simple minerals and next to quartz, one of the most abundant.

Feldspathic, of or belonging to feldspar.

Ferruginous, containing iron.

Fluvatile, belonging to a river.

Formation. Deposits having a common origin, or formed during the same era or period.

Fossils. Remains of plants and animals buried in the earth.

Fossiliferous. One of the grand divisions of rocks characterized by the presence of fossils.

Galena. Sulphuret of lead, or sulphur and lead; one of the common ores of lead.

Gangue. The earthy or rocky material which embraces directly the metalliferous compounds in any vein.

Garnet. A hard reddish or brownish mineral usually crystallized in the form of a solid having twelve rhombic or diamond shaped faces or planes.

Geology. A science which has for its object the investigation of the structure of the earth and the materials of which it is composed. Connected with these investigations, are deductions which may be derived legitimately from the known influence and effects of causes; these are employed as expressions of the *modus operandi* by which the earth has been brought to its present state.

Gneiss. A stratified primary rock, composed of quartz, feldspar and mica.

Granite. An unstratified rock, composed of quartz, feldspar and mica.

Grauwacke, graywacke. The name was originally applied to a rock composed of grains and pebbles cemented together by clay. It belongs to the transition series. The name is applied also to a group of rocks in the same series, consisting of sandstone, slates or shales, alternating with limestone, sandstone, &c. The term is rather indefinite, yet very frequently used.

Green sand. Beds of sand, sandstone, limestone and marly clays, intermixed somewhat with greenish particles, belonging to the cretaceous period, and situated beneath the true chalk.

Greenstone. A variety of trap, composed of feldspar and hornblende.

Grit. Coarse grained sandstone.

Gypsum. A mineral composed of sulphuric acid and lime.

Hornblende. A mineral, usually of a dark green colour. Crystallizing in long slender prisms.

Hornstone. A silicious translucent mineral, resembling flint, but tough and more difficult to break.

Incandescent. White hot—a degree of heat more intense than that at redness.

Iceberg. Floating masses of ice.

Ichthyosaurus. A fossil reptile, intermediate between the crocodile and fish. A fish lizard.

Induction. A consequence, conclusion, or inference, or some general principle drawn from facts or phenomena.

In-situ. Original position.

Isothermal. Equality of temperature. Zones, lines, &c. where an equality of temperature prevails are called *isothermal*.

Lacustrine, of, or belonging to, a lake.

Laminae. Plates, sometimes used as synonymous with layers.

Landslip. Land which has slidden down an inclined plane, from its position in a bank or terrace. It is generally produced by water, which either undermines the mass of earth, or insinuates itself into it, so as to render it semi-fluid.

Line of Bearing. The point of compass to which the anticlinal ridge or line runs, or is directed. When the anticlinal ridge cannot be determined, the *line of direction* may be known by ascertaining the intersection of the planes of the strata with the plane of the horizon, that will be the line of bearing.

Lithological. The character of a rock or formation considered with reference solely to its mineral composition.

Lignite. Wood partially carbonized in the earth; it usually retains the vegetable structure. The change does not seem to have been effected by heat, but is the result of some chemical process, as the action of pure sulphuric acid in some instances, and of water in others.

- Littoral*, of, or belonging to, the shore.
- Loam*. A mixture of sand and clay.
- Mural Escarpment*. A rocky cliff, more or less inclined.
- Mammillary*. Protuberances on the surface of a mineral, which are segments of a sphere; mammæ, breasts.
- Mammoth*. An extinct species of animal, allied to the elephant.
- Marl*. Any mixture of clay and carbonate of lime, which effervesces with acids.
- Matrix. Gangue*. The mineral mass which is in immediate contact with the ore of a metal, both of which constitute a vein.
- Manganese*. A hard black mineral, resembling the dark coloured hematites. It is the oxide of manganese, one of the metals.
- Megatherium*. One of the extinct fossil quadrupeds, resembling the sloth.
- Mechanical origin of*, Rocks composed of sand, pebbles, &c. or sedimentary rocks generally, are said to have a mechanical origin. The term is used in contradistinction to rocks having a crystalline structure, which have a chemical origin.
- Mica*. Sometimes called isinglass. A mineral, which may be split into numerous elastic laminæ.
- Mica slate*. A primary rock, composed of fine grains of quartz, and generally small scales of mica. It is eminently fissile.
- Miocene*. An era or period subsequent to the eocene, and characterized by a greater proportion of animals analogous to those now living. Deposits formed during this period are termed miocene strata.
- Molusca*. Molluscan animals. Those soft animals, whose covering is a thick shell, as oyster and clam.
- Monocotyledonous*. One of the grand divisions of the vegetable kingdom. It includes the grasses, palms, liliacæ, and whose seed have only one lobe.
- Mountain limestone*. A series of limestone strata immediately below the coal measures.
- Muriate of Soda*. The chemical name for common salt, because it is composed of muriatic acid and soda.
- Naphtha*. A very thin volatile, inflammable liquid, of which there are springs in some volcanic districts.
- New Red Sandstone*. A series of sandy, argillaceous, and often calcareous strata, whose predominant colour is brick red, but contains many spots and stripes, which are gray and greenish gray. It is therefore sometimes called the variegated sandstone. It overlies the coal measures.
- Nucleus*. A solid central piece, around which layers of the same or other matter has collected. The kernel.
- Old Red Sandstone*. A rock belonging to the carboniferous group.
- Oolite. Oolitic*. A limestone composed of rounded grains, like the roe or eggs of fish. The name is applied to a large group of strata, characterized by peculiar fossils. Only a part have this peculiar structure.
- Orthocera, orthoceratite*. An extinct genus of animals belonging to the order Mollusca. They inhabited long strait tapering shells, divided into parts by septa or partitions. Common in the transition or Trenton Falls limestone.
- Outcrop*. The edges of strata, as they appear at the surface.

- Outliers.* The detachment of a mass of rock from the general formation to which it belongs; or it is a term applied to a mass which appears as if it was detached from the general formation, as its outcrop is at a distance from it.
- Oxide.* The combination of a metal, or any substance with oxygen, which is not acid.
- Oxygen.* One of the constituent elements of the air and water; that portion of the air which supports life and combustion.
- Pachydermata.* An order of animals with thick skins, as the hog, elephant, rhinoceros, mammoth, &c.
- Palæontology.* The science which treats of fossil remains, both animal and vegetable.
- Pelagian.* Belonging to a deep sea.
- Petroleum.* Mineral pitch; a liquid approaching the consistence of tar, of a bituminous odor, and which oozes out of a rock.
- Phlegrean fields.* The burnt fields; applied by the Greeks to the region around Naples, from the marks of igneous action every where visible.
- Pisolite.* A stone composed of rounded particles like peas, agglutinated together.
- Pliocene.* An era or period analogous to the present, and more recent than the *miocene*. A large proportion of the animal remains of the *pliocene* strata still exist.
- Porphyry.* A rock having a base whose structure is more or less compact, in which there are disseminated crystals of feldspar.
- Productus.* A bivalve fossil shell, concave on one side and convex on the other.
- Plastic clay.* One of the beds of eocene tertiary period.
- Plesiosaurus.* A fossil extinct reptile, having a close resemblance to a lizard.
- Precipitate.* The fine powder which separates from solutions after standing, or which are disengaged by the chemical action of bodies added to those solutions.
- Pumice.* A light spongy lava.
- Puddingstone.* Indurated or cemented masses of rounded pebbles, sand, &c.
- Pyrites.* A mineral composed of sulphur and iron, or sulphur and copper.
- Quartz.* The term universally applied to a simple mineral composed of nearly pure silice. Rock crystal is an example.
- Rock.* A term applied to all mineral beds or masses.
- Sandstone.* A rock composed of grains of sand.
- Saurians.* Animals belonging to the tribe of lizards.
- Sacchoroidal.* Resembling loaf sugar.
- Schist, schistose.* Slate and slaty.
- Septaria.* Flattened balls of stone traversed by seams of calcareous spar, or some other mineral. The outer surface has the appearance of a turtle's back; and hence they have been considered, by persons of little observation, as petrified turtles.
- Shale.* Generally used as synonymous with slate.
- Shell Marl.* The name is applied to recent fresh-water deposits, which consist of marl and numerous shells of *Helices*, *Planorbis*, &c. intermixed.

Shingle. Beaches and shores covered with water-worn pebbles and gravel.

Silex. One of the simple earths, nearly pure in rock crystal.

Silt. The finer particles of the earths suspended and transported by water.

Simple, when applied to minerals and rocks, has reference to their homogeneity, and not to the number of elements which enter into their composition.

Stalactite. A pendant cylindrical mass of carbonate of lime, attached to the roof of a cave.

Stalagmite, is a mass of concretioned limestone formed beneath the stalactite, by water dropping from it charged with carbonate of lime.

Stratum, strata, stratification. The arrangement of the layers of a rock in parallel position.

Strike. The direction in which the edge of a stratum appears at the surface.

Syenite, sienite. A variety of granite, in which hornblende replaces the mica.

Synclinal line, or axis. Where the strata dip downwards like the sides of a gutter.

Talus. A collection of rocks and stones beneath a cliff.

Tertiary. The fourth grand division of the rocky strata, composed of clays, gravels, and sometimes of consolidated beds of limestone and silicious matter; all of which are more recent than those of the three preceding divisions, as primary, transition and secondary.

Testacea. Molluscous animals having a shelly covering.

Tepid. Warm.

Thermal. Hot.

Thin out. The diminution in the thickness of strata, until they disappear.

Trap, trappean rocks. Ancient volcanic rocks composed of feldspar, hornblende, and hornblende and augite. Basalt, greenstone, amygdaloid and dolerite, are the most common of this class of rocks. They are sometimes called *superincumbent rocks*, because they rest or repose irregularly or indifferently on any of the other rocks. The pure hornblende rocks were formerly termed *primitive trap*.

Travertin. A deposit of carbonate of lime, more or less porous and earthy, from the water of springs; sometimes it is hard and semi-crystalline.

Tufa, calcarious and silicious. Porous or earthy deposits from springs of water, containing lime or silex.

Tuff, or Tufa, Italian. A name for a volcanic rock of an earthy texture.

Unconformable. See *Conformable*.

Veins. Openings or fissures in rocks, filled with stony or metallic matter.

Zoophites. Animals of the lowest order, as sponges, corals, &c.

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STATE OF NEW-YORK.

No. 276.

IN ASSEMBLY,

February 19, 1839.

ANNUAL REPORT

Of the Canal Bank of Albany, in relation to un-
claimed deposits.

CANAL BANK, }
Albany, Feb. 19, 1839.

To the Hon. GEORGE W. PATTERSON,

Speaker of the House of Assembly.

SIR—I have the honor to transmit herewith, as required by the act
of May 9, 1835, a statement of unclaimed deposits in this bank.

Very respectfully, your ob't serv't,

T. OLCOTT, *Cashier.*

CANAL BANK, *Albany, Sept. 1, 1838.*

*Statement of unclaimed deposits of over two years' standing, on the books
of the Canal Bank.*

1834. April 15, Seeley & Dayton,	\$25 59
1835. Jan. 13, John M. Newton,	36 65
1836. Jan. 15, E. Worcester,	2 00
“ Feb. 3, John T. Norton,	50 00
“ “ 15, H. A. Bancraft,	11 48
“ “ 16, Bank of Salina,	212 36
“ May 28, J. H. Prentice and A. T. Evertsen,	94 99

T. OLCOTT, *Cashier.*

Sworn before me, this 30th day }
of October, 1838. }

T. M. BURT, *Com. of Deeds.*

No. 575

IN ASSEMBLY,
February 12, 1880

JOURNAL REPORT

For the Bank of Albany in relation to the
deposited deposits

By the Bank of Albany

Report of the Bank of Albany

to the House of Assembly

and to the Senate, as required by the act
of the 17th March, 1879, in relation to the

deposited deposits

T. OLCOTT, Cashier

Albany, N. Y., Feb. 1, 1880

Report of the Bank of Albany, showing the
condition of the Bank, as required by the act

1879	1878	1877	1876	1875	1874	1873	1872	1871	1870	1869	1868	1867	1866	1865	1864	1863	1862	1861	1860	1859	1858	1857	1856	1855	1854	1853	1852	1851	1850	1849	1848	1847	1846	1845	1844	1843	1842	1841	1840	1839	1838	1837	1836	1835	1834	1833	1832	1831	1830	1829	1828	1827	1826	1825	1824	1823	1822	1821	1820	1819	1818	1817	1816	1815	1814	1813	1812	1811	1810	1809	1808	1807	1806	1805	1804	1803	1802	1801	1800	1799	1798	1797	1796	1795	1794	1793	1792	1791	1790	1789	1788	1787	1786	1785	1784	1783	1782	1781	1780	1779	1778	1777	1776	1775	1774	1773	1772	1771	1770	1769	1768	1767	1766	1765	1764	1763	1762	1761	1760	1759	1758	1757	1756	1755	1754	1753	1752	1751	1750	1749	1748	1747	1746	1745	1744	1743	1742	1741	1740	1739	1738	1737	1736	1735	1734	1733	1732	1731	1730	1729	1728	1727	1726	1725	1724	1723	1722	1721	1720	1719	1718	1717	1716	1715	1714	1713	1712	1711	1710	1709	1708	1707	1706	1705	1704	1703	1702	1701	1700	1699	1698	1697	1696	1695	1694	1693	1692	1691	1690	1689	1688	1687	1686	1685	1684	1683	1682	1681	1680	1679	1678	1677	1676	1675	1674	1673	1672	1671	1670	1669	1668	1667	1666	1665	1664	1663	1662	1661	1660	1659	1658	1657	1656	1655	1654	1653	1652	1651	1650	1649	1648	1647	1646	1645	1644	1643	1642	1641	1640	1639	1638	1637	1636	1635	1634	1633	1632	1631	1630	1629	1628	1627	1626	1625	1624	1623	1622	1621	1620	1619	1618	1617	1616	1615	1614	1613	1612	1611	1610	1609	1608	1607	1606	1605	1604	1603	1602	1601	1600	1599	1598	1597	1596	1595	1594	1593	1592	1591	1590	1589	1588	1587	1586	1585	1584	1583	1582	1581	1580	1579	1578	1577	1576	1575	1574	1573	1572	1571	1570	1569	1568	1567	1566	1565	1564	1563	1562	1561	1560	1559	1558	1557	1556	1555	1554	1553	1552	1551	1550	1549	1548	1547	1546	1545	1544	1543	1542	1541	1540	1539	1538	1537	1536	1535	1534	1533	1532	1531	1530	1529	1528	1527	1526	1525	1524	1523	1522	1521	1520	1519	1518	1517	1516	1515	1514	1513	1512	1511	1510	1509	1508	1507	1506	1505	1504	1503	1502	1501	1500	1499	1498	1497	1496	1495	1494	1493	1492	1491	1490	1489	1488	1487	1486	1485	1484	1483	1482	1481	1480	1479	1478	1477	1476	1475	1474	1473	1472	1471	1470	1469	1468	1467	1466	1465	1464	1463	1462	1461	1460	1459	1458	1457	1456	1455	1454	1453	1452	1451	1450	1449	1448	1447	1446	1445	1444	1443	1442	1441	1440	1439	1438	1437	1436	1435	1434	1433	1432	1431	1430	1429	1428	1427	1426	1425	1424	1423	1422	1421	1420	1419	1418	1417	1416	1415	1414	1413	1412	1411	1410	1409	1408	1407	1406	1405	1404	1403	1402	1401	1400	1399	1398	1397	1396	1395	1394	1393	1392	1391	1390	1389	1388	1387	1386	1385	1384	1383	1382	1381	1380	1379	1378	1377	1376	1375	1374	1373	1372	1371	1370	1369	1368	1367	1366	1365	1364	1363	1362	1361	1360	1359	1358	1357	1356	1355	1354	1353	1352	1351	1350	1349	1348	1347	1346	1345	1344	1343	1342	1341	1340	1339	1338	1337	1336	1335	1334	1333	1332	1331	1330	1329	1328	1327	1326	1325	1324	1323	1322	1321	1320	1319	1318	1317	1316	1315	1314	1313	1312	1311	1310	1309	1308	1307	1306	1305	1304	1303	1302	1301	1300	1299	1298	1297	1296	1295	1294	1293	1292	1291	1290	1289	1288	1287	1286	1285	1284	1283	1282	1281	1280	1279	1278	1277	1276	1275	1274	1273	1272	1271	1270	1269	1268	1267	1266	1265	1264	1263	1262	1261	1260	1259	1258	1257	1256	1255	1254	1253	1252	1251	1250	1249	1248	1247	1246	1245	1244	1243	1242	1241	1240	1239	1238	1237	1236	1235	1234	1233	1232	1231	1230	1229	1228	1227	1226	1225	1224	1223	1222	1221	1220	1219	1218	1217	1216	1215	1214	1213	1212	1211	1210	1209	1208	1207	1206	1205	1204	1203	1202	1201	1200	1199	1198	1197	1196	1195	1194	1193	1192	1191	1190	1189	1188	1187	1186	1185	1184	1183	1182	1181	1180	1179	1178	1177	1176	1175	1174	1173	1172	1171	1170	1169	1168	1167	1166	1165	1164	1163	1162	1161	1160	1159	1158	1157	1156	1155	1154	1153	1152	1151	1150	1149	1148	1147	1146	1145	1144	1143	1142	1141	1140	1139	1138	1137	1136	1135	1134	1133	1132	1131	1130	1129	1128	1127	1126	1125	1124	1123	1122	1121	1120	1119	1118	1117	1116	1115	1114	1113	1112	1111	1110	1109	1108	1107	1106	1105	1104	1103	1102	1101	1100	1099	1098	1097	1096	1095	1094	1093	1092	1091	1090	1089	1088	1087	1086	1085	1084	1083	1082	1081	1080	1079	1078	1077	1076	1075	1074	1073	1072	1071	1070	1069	1068	1067	1066	1065	1064	1063	1062	1061	1060	1059	1058	1057	1056	1055	1054	1053	1052	1051	1050	1049	1048	1047	1046	1045	1044	1043	1042	1041	1040	1039	1038	1037	1036	1035	1034	1033	1032	1031	1030	1029	1028	1027	1026	1025	1024	1023	1022	1021	1020	1019	1018	1017	1016	1015	1014	1013	1012	1011	1010	1009	1008	1007	1006	1005	1004	1003	1002	1001	1000	999	998	997	996	995	994	993	992	991	990	989	988	987	986	985	984	983	982	981	980	979	978	977	976	975	974	973	972	971	970	969	968	967	966	965	964	963	962	961	960	959	958	957	956	955	954	953	952	951	950	949	948	947	946	945	944	943	942	941	940	939	938	937	936	935	934	933	932	931	930	929	928	927	926	925	924	923	922	921	920	919	918	917	916	915	914	913	912	911	910	909	908	907	906	905	904	903	902	901	900	899	898	897	896	895	894	893	892	891	890	889	888	887	886	885	884	883	882	881	880	879	878	877	876	875	874	873	872	871	870	869	868	867	866	865	864	863	862	861	860	859	858	857	856	855	854	853	852	851	850	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STATE OF NEW-YORK.

No. 277.

IN ASSEMBLY,

February 23, 1839.

ANNUAL REPORT

Of the New-York Chemical Manufacturing Company.

Statement of the New-York Chemical Manufacturing Company, from
February 1st, 1838, to February 1st, 1839.

Stock purchased during the year,.....	\$21,110 54
Repairs of factory, wages of men and incidental expenses,	34,395 43
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	\$55,505 97
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204,858 lbs. bleaching powders,.....	\$14,572 82
634,550 lbs. alum,	30,384 09
112,067 lbs. oil vitriol,	6,458 52
187,582 lbs. copperas,.....	4,079 13
12,354 lbs. nitric acid,	2,105 33
9,772 lbs. muri. acid,	809 15
8,240 lbs. ether and aq. ammo.....	1,718 44
1,232 lbs. mur. tin. mur. cop.....	256 15
15,900 lbs. blue vitriol,.....	1,795 87
	<hr/>
	62,179 50
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jealous of our sovereignty, and determined to resist aggressions upon the rights or territory of the Union. The passage of the act of Congress, to which I have referred, provisionally contemplates that the country may, during the recess of that body, be compelled to assume an attitude of defence against a foreign power, and seems therefore to present one of those occasions which call for such an expression on the part of the several States. The measures adopted by Congress, seem to me to have been wisely designed to preserve the existing inestimable relations of peace between this country and Great Britain, as well as to vindicate the rights of the State of Maine, and to maintain the honor and dignity of the nation. It can scarcely be believed that enlightened and Christian nations, bound to each other in peculiar relations of feeling and of interest, will unnecessarily suffer the harmony existing between them to be interrupted. The Governments of both as well as their individual citizens, are under the strongest obligations to cultivate every disposition to amity and to repress all tendencies to hostile action. At the same time peace is seldom the lot of any nation which does not on all proper occasions manifest that it knows its rights, and will at all hazards maintain them. I respectfully call your attention to the subject, under the expectation that an expression on our part of concurrence in the policy of the General Government, will contribute to avert the calamities of war, and secure the speedy and honorable adjustment of the existing differences between this country and Great Britain.

WILLIAM H. SEWARD.

IN ASSEMBLY,

March 7, 1839.

REPORT

Of the select committee, on the petition of Elijah Shoemaker, and others.

Mr. Dunham, from the select committee, to which was referred the petition of Elijah Shoemaker and others, praying that the number and time of holding the county courts of Tioga, might be altered,

REPORTS:

The petition which your committee have had under consideration is subscribed by the judges of the county courts, sheriff and clerk of the county, and the last grand jury convened as such in said county, and they represent that there are four terms of the county courts held in said county, and that two of said terms are held in April and October; that the April term interferes with the lumbering business of the county, and is therefore productive of much inconvenience; that the October term of said court is held at the same time with the October term of the supreme court, which is productive of inconvenience to the bar of said county.

The petitioners affirm that three terms of said county courts will be amply sufficient for the accommodation of the business of the county, and your committee are sensible that if a term of said court can be dispensed with, justice to parties, witnesses and jurors, requires that it should be done.

The petitioners desire that but three terms of said court may hereafter be held in said county, and that said terms should be held on the first Mondays of February, June, and October. And your committee deeming the prayer of the petitioners reasonable, have directed their chairman to report a bill accordingly.

RESOLUTIONS

Of the General Assembly of Indiana.

EXECUTIVE DEPARTMENT, }
Indianapolis, February 20th, 1839. }

SIR—

Agreeably to the request of the General Assembly of the State of Indiana, I transmit you the enclosed copy of a joint resolution, with the request that you communicate the same to the Legislature of your State.

Respectfully,

I have the honor to be,

Your obedient,

DAVID WALLACE.

His Excellency the Governor of New-York.

RESOLUTIONS.

Resolved by the General Assembly of the State of Indiana, That any interference in the domestic institutions of the slaveholding States of this Union, (without their consent,) either by Congress, or the States Legislatures, is contrary to the compact by which these States became members of the Union.

Resolved, That any such interference is highly reprehensible, unpatriotic, and injurious to the peace and stability of the union of the States.

TH. J. EVANS,

Speaker of the House of Reps.

DAVID WALLACE,

President of the Senate.

Approved, 1839.

DAVID WALLACE.

No. 283.

IN ASSEMBLY,

March 5, 1839.

REPORT

Of the committee on canals and internal improvements on the several memorials of Hervey Ely, Wm. Fitzhugh, Jonathan Child, Thomas Kempshall, Joseph Strong, Maltby Strong and John T. Potter.

Mr. N. Cook, from the committee on canals and internal improvements, to whom was referred the memorials of Hervey Ely, Wm. Fitzhugh, Jonathan Child, Thomas Kempshall, Joseph Strong, Maltby Strong and John T. Potter,

REPORTS:

That the memorials of the above named individuals set forth that they are injured by the appropriation of their property in the city of Rochester, under the act entitled "An act to provide for the improvement of the canals of this State," passed May 6, 1834, and other acts of a similar nature passed subsequently thereto, and by the rules adopted by the canal appraisers in the appraisalment of their said property upon such appropriation.

It appears from the papers presented to and the statements made before the committee in their cases, that the Erie canal in the city of Rochester, and the canal aqueduct over the Genesee river at that place, were completed in the year 1823; that in the original appropriation of lands for the construction of the Erie canal at that place, in many instances but little precision was regarded as to the boundaries of the lands appropriated; and as to the aqueduct over the Genesee river, there

was no appropriation made with any specific boundaries. Upon the completion of the canal, it seemed to be generally understood on the part of the owners of the lands and the Canal Commissioners, that the State had acquired title by location to the land occupied by the canal, with a sufficiency on each side to protect its banks, slopes and erections for the tow-path, berm-bank, and the banks necessary to support them; and that the lands upon the outside of and up to these necessary lines belonged to and remained with the original owners, to be used as they should think proper.

This was a practical location, dictated by common sense and common justice, which, while it gave to the State all they needed, reserved to individuals all they could justly ask. In relation to this, the memorialists say, "that persons in the city of Rochester owning lands through which the canal passed, and who had neither received compensation or given releases to the State, considered and honestly believed, that after the canal was finished and permanently located, that so much of the land as they owned as was not actually taken for the canal was perfectly free and exonerated from all claim by the State; that the width of the canal, its banks and slopes, and the quantity of ground occupied by the spoil bank, and the width of the tow-path and the berm-bank, and the banks necessary to support them, was an actual practical location of the canal, with all the lands necessary for its use." They also say, that "it is a well settled principle of law, as between individuals holding lands adjoining each other, who have practically located the line between them by improving on both sides up to that line, that an acquiescence in such line for a considerable time is conclusive between them as to the line dividing their property;" and ask, "why the same rule should not be considered as conclusive, or at any rate as *prima facie* evidence between the State and individuals."

It appears also that the memorialists are severally owners of different lots of land in the city of Rochester, adjoining to the Erie canal, and that upon many of these lots valuable buildings were erected and improvements made, which buildings were erected and improvements were made up to the line practically occupied by the State, and that the same was done under the knowledge of the Canal Commissioners and engineers, and without any objection on their part, or intimation that the erections were improperly made. 'Most of these buildings were erected soon after the completion of the canal, and before the passage of the law authorizing a map of the canals and of the property held by the State as appurtenant thereto to be made; and many of these lots have

repeatedly been sold at prices enhanced by the value of the erections and the increase of the value of the several lots, and they have been occupied and held by the respective owners for periods of from twelve to fifteen years, with as much confidence and security as they held their other property, which confidence was inspired by the acquiescence of the Canal Commissioners for so long a time in such occupation of the property, and by the fact that they never during all that time set up any pretence or gave any intimation that any part of such property belonged to the State, or that any such building interfered with any of the rights of the State.

It further appears, that certain portions of said property consists of several mill seats, lying south of and adjoining the Erie canal aqueduct over the Genesee river, which mill seats were laid out by the proprietors of that portion of the city of Rochester; and the memorialists claim that at the time they were laid out said mill seat sites were upon the solid land on the west bank of the Genesee river; that in consequence of work done about the erection of the aqueduct the earth has been worn or moved from the rock beneath, and left the same bare, so that the water now occasionally runs over the same; that upon several of these mill sites mills had been erected up to the line of practical occupation by the State, and in some cases in front of some of the arches of the aqueduct, and that the erections made as above mentioned, were made to the knowledge of and without any objection on the part of the Canal Commissioners, and are a part of the same buildings heretofore mentioned.

It further appears, that the act of May 6, 1834, above mentioned, provides for the reconstruction of the Rochester aqueduct upon the site of the old aqueduct, and that by the 8th section of that act the Canal Commissioners were required to have the damages which individuals might sustain for the appropriation of land for that purpose appraised before the taking possession of any lands for the same purpose. Under the provisions of this act, the Canal Commissioners gave notice to some of the memorialists that certain portions of their lands, and particularly the mill sites above mentioned, would be wanted for the purposes contemplated by said act, and would be taken for the same object; and also notified the said memorialists that their damages for the appropriation of the said lands would be appraised by the board of canal appraisers.

In the month of October, 1834, the board of appraisers, consisting of Mr. Hoffman, Canal Commissioner, and Messrs. Skinner & Angel,

appraisers, attended by the Hon. Samuel Young, also a Canal Commissioner, acting as counsel for the State on such appraisal, met at the city of Rochester. The owners of the said mill sites presented their respective claims for damages, and claimed compensation for the ground and buildings up to the line of practical location for canal purposes.—The board of canal appraisers on such hearing exhibited a copy of a map, which they alleged was a part of a true copy of a map made by the Canal Commissioners, and sanctioned by the Canal Board, and filed in the office of the Comptroller; and that said map had been made by the said Canal Commissioners pursuant to the 4th, 5th and 7th sections of title 9, chapter 9, of the 1st part of the Revised Statutes. The exterior south line of said map contained the lands set apart and proposed to be appropriated by the Canal Commissioners, and also contained an interior line, which was designated on the said map and by the said appraisers, as the “blue line;” and all the land between the “blue line” and the canal, was claimed by the counsel for the Canal Commissioners as belonging to and being the property of the State; and that the map from which said copy was made, was, according to the 7th section of said law, presumptive evidence of the validity of such claim. It is a further fact in these cases, that the “blue line” was south of, and farther distant from the canal, than the line of practical location, up to which the parties had occupied and built, in the manner before mentioned, and consequently cut off a part of the buildings and a part of the lots of the memorialists, as claimed, occupied, and built upon by them.

The memorialists resisted the claim of presumptive title in the State between the line of practical location and the “blue line,” by insisting that there had been no appropriation of said land for the purposes of the canal, at the original construction of the canal and aqueduct; that there had not, at that time, or afterwards, been any taking of such lands by any defined or specific bounds, and that there had only been an actual appropriation of so much as was necessary for the use of the canal and the protection of its works; that a line of practical location had been assumed, both by the owners of the land and the Canal Commissioners, soon after the completion of the canal, and before the passage of the law in relation to said map; that the owners had built up to such line of practical location with the knowledge and without the dissent of the Canal Commissioners, and had continued to hold, possess and enjoy such lands up to the said line, down to the time of hearing. Also, that the law to which the appraisers referred, was only intended to authorize the Canal Commissioners to survey, and describe on a map, the lands

actually owned by the State of New-York, as described in the cessions thereof by the former owner, or in some legal act of appropriation thereof by the State, and that said law was not intended to make any new appropriation, but merely to define the old; that if it was intended to make any new appropriations of lands beyond that actually occupied by the canal, notice thereof should be given to the owners, which was not done, and that if an appropriation of land was claimed by virtue of that map and act, such act was unconstitutional, and therefore nothing passed by it. The memorialists state, that they were before that time ignorant of the fact that such a map was made, and ignorant of the mode in which the "blue line" thereon cut their aforesaid lots; and that there had not at the time of making said map been any appropriation of the lands between the line of practical location and the "blue line," or any notice given to them at that time, or any time before said hearing, that the lands between said lines were claimed by the State. They further insist, that the said "blue line" was not made from any actual survey, but was a mere imaginary line run by the engineer upon the map, at a certain distance from the sides of the canal, and without reference to peculiarities of ground or location. They further insisted that the 6th section required that a copy of such map, with the field books and notes, should be transmitted by the Comptroller to every county intersected by the canal, and filed in the clerk's office of such county; and that such had not been done in Monroe county, and by consequence that the memorialists did not know, and had not the means of knowing, how much land the State claimed, or had reason for believing that they claimed any thing beyond the line of practical location.

The memorialists say further, if the said transcript of said map is to be taken as "presumptive evidence" that the land within the "blue line" belongs to the State, that like all other presumptions, it may be rebutted by proof of circumstances, in opposition to such presumptions; and they state several facts which they rely upon, as furnishing proof to rebut such presumptions. We quote their language:

"Before laying out the canal, Johnson and Seymour owned lands on the east side of the river, part of which they had laid out into mill sites, and had constructed a race-way to bring water from the river for those sites, and upon some of which sites machinery had been erected. Before the canal was originally constructed, this raceway was about 30 to 40 feet wide. The Commissioners, when they located the canal, took the whole of this race-way, for a considerable distance from the old aqueduct south, as a part of the site of the canal, and then constructed

a new race-way for the mill sites in lieu of the old race, between the old race-way and the river, the southern part extending into the river; which new race-way was of a general width of from 30 to 35 feet. And they constructed on the east side of the new race-way, and between that and the canal, a permanent stone wall, of from 8 to 10 feet thick at the base, and from 5 to 6 feet thick at the top; and which supported on the east side thereof, a heavy embankment. This wall and embankment formed a complete and permanent separation between the canal and the new race-way.

“The ‘blue line’ on the map, follows the course of the aqueduct and canal, distant from the northerly and westerly wall thereof, from 10 to 20 feet, and passes through the said new race-way; and from the north line of the new aqueduct about 400 feet southerly, and includes between that and the said wall, a part of the said race-way, of about 17 feet at the north end, and on the north line of the new aqueduct, and 20 feet at the south end thereof, so as to leave the said new race-way only about 13 feet in width. Here then is the new raceway made by the original Canal Commissioners, and at the expense of the State, for the accommodation of the said mill sites, and in lieu of the old race-way, and a permanent separation made by them between the said canal and the said new race-way; and yet, this ‘blue line’ sets apart more than half of this new race-way, as covering land belonging to the State. Now this single fact gives the true character to this map, and shows that this ‘blue line’ was run without any regard to the original location of the canal. For it is palpably absurd to suppose that the Commissioners who made this wall and new race-way, ever intended that any part of this new race-way should be taken or held as the property of the State.

“And your memorialists will refer your honorable body to another fact, which will conclusively show that the ‘blue line’ was run, and the map made, with an entire disregard to the original location of the canal, or the rights of persons owning land adjoining thereto. When the canal was laid out your memorialist, Hervey Ely, owned a lot on Washington-street, in the city of Rochester, a part of which was taken for the canal, and which is now owned by your memorialist, Jonathan Child. The canal through this lot run through a bank, which, on the south side of the line of the canal as laid out, was about 12 feet high, and sloped off on the north side, to nearly a level with the bed of the canal. On the south side of the towing-path, a permanent stone wall was erected about 12 feet high, and the part of the lot immediately south of the

top of this wall, has ever since been occupied up to this wall, partly as a court yard, and partly as a fruit yard and garden. And yet, the 'blue line' was run through these yards, about ten feet south of the top of this wall, which your memorialists insist was, by the act of the Canal Commissioners themselves made, and intended to be the south line of the lands claimed for the canal. So that these facts entirely rebut the presumptive evidence arising from the map, and entirely destroy its credit as evidence in any case.

"Again, the occupation by your memorialists of their said buildings, for the length of time herein before mentioned, and under the eye of the Canal Commissioners, and without their disapprobation, affords sufficient evidence to destroy the presumptive evidence arising from the map.

"Again, in the case of your memorialist Jonathan Child, Myron Holley, one of the original Canal Commissioners, swore that he did not think there was any line specifically drawn to define the outer lines of the ground taken by the State, other than for the location and construction of the work. That the engineer made notes of these surveys, in which they set down the width of the canal, its banks and slopes, and the quantity of ground occupied by the said banks; and that they designated the width of the towpath and berm bank, and the banks necessary to support them. The affidavit of the said Myron Holley, herein annexed, will show more fully and in detail, how the bed of the canal, towpath, &c. were originally located, and the extent thereof, as regards the land originally taken and occupied thereby.

"Surely all this is sufficient to rebut the feeble presumption arising from the map, made in the manner and under the circumstances herein before mentioned. It was therefore unjust in the appraisers to make this map under these circumstances, conclusive evidence of the title of the State for the land within the 'blue line,' and for refusing on that ground to allow your memorialists any compensation for the same land."

It appears further from the facts adduced before your committee, that the tier of mill sites, being seven in number, as before mentioned, lying south of the old Rochester aqueduct, are about twenty-five feet from said aqueduct, and each about sixty feet deep, and are each entitled to a water power of four run of stones, and each had an interest in common in a large mill yard still south of said mill sites.

In relation to all of these said mill sites, it was urged on the part of the Canal Commissioners before the said board of appraisers,

1. That the whole of these mill sites were originally appropriated to the use of the canal, and that as no claim for damages had been presented within the time allowed by the different statutes, the owners were barred from urging any claim for damages.

2. That by the grant or appropriation of the lands for the aqueduct, every incident would follow which was necessary to its perfect enjoyment for that purpose, and that it was necessary to have these mill sites clear of buildings for the perfect safety of the aqueduct.

3. That these mills were situated within the Genesee river, and that the Genesee river has by law been declared to be a public highway, and that therefore it was a nuisance to place these mills within such highway.

4. That these mills were placed before the arches of the aqueduct opposite said mills, and obstructed the flow of water through said arches in times of flood, and also obstructed the ice, timber and drift wood from passing, to the hazard of the aqueduct and its safety; and that the construction of such arches was itself notice to the owners of property lying south of the same that they must not build upon their said property, and that if they did build upon it, their buildings were nuisances, and liable to be removed as such.

To these claims on the part of the Canal Commissioners, it was urged on the part of the memorialists,

1. That no grant was ever made of these mill lots for the purposes of the canal, nor any appropriation of the same, further than the building of the aqueduct itself constituted an appropriation; and that as there was never before any claim set up by the State for these lots, and the owners had been constantly permitted to occupy them, without question or objection on the part of the State or its agents, they had a right to infer, that as in fact they were not granted, also that they were not understood by the State to be appropriated, so not knowing that the State had, or pretended to have any claim to the land, the owners could not be called upon to put in any claim for damages, and that under such circumstances, they are not barred by any statute of limitations. In this connexion, the memorialists likewise state a fact, which they insist shows in what light the Canal Commissioners themselves looked upon these lots, which is, that in 1825, Cyril Carpenter and Derrick Sibley owned one of these lots, upon which there was a saw-mill built before that year; that in the year 1825 the water of the Genesee river was nearly all diverted into the Erie canal, for the purpose of supplying

the levels east of Rochester with water; and that by reason of such withdrawal of water from the Genesee river, the operations of said saw mill were suspended; and upon claim of damages by the owners of said saw mill, for such suspension in its operations, the Canal Commissioners allowed such owners the sum of \$617.07 for such damages; and thereby clearly recognizing the right of said owners to the said saw mill and the lot on which it stood; and proving, that in the opinion of the Canal Commissioners at that time, the mill was not improperly erected, and that the lot was not claimed or understood to belong to the State.

The memorialists also, in this connexion, state another fact, viz: that when the old aqueduct was constructed, it passed through mill lots, which had been originally laid out by the owners of the land, and that the then acting Canal Commissioners on that section, or the chief engineer, David S. Bates, informed the said original owners that they might lay out the said mill sites south of the said aqueduct, and that they would construct arches in the said aqueduct through which they might conduct the tail races, from the said mill sites, and thus again explicitly recognizing the right of the owners of the said mill lots. Both of the facts above mentioned, are substantiated by affidavits furnished to your committee.

The memorialists also state the further fact, that since mills were erected upon the said lots, the Canal Commissioners, or some of them, have yearly or oftener, visited the city of Rochester, and seen the mills erected upon said lots, and seen them in operation, and have never made any objection or complaint in relation thereto, or intimated that the State claimed title to the said mill sites, and that therefore the owners had no reason to believe or suspect that they were so claimed for the State, or that any necessity existed for presenting any claim of damages for the appropriation thereof.

2. That there was never any grant or appropriation of these mill sites, and the facts stated in answer to the first claim of the Commissioners, shows that the Commissioners themselves never supposed there was any such grant, and consequently that the incidents claimed would not follow a grant or appropriation that did not exist.

3. That if the Genesee river was a highway, these mill sites were not in its bed, but upon what was before the aqueduct was constructed, a part of the solid ground on the west bank of the river, though sometimes in floods, the water flowed over them; which fact is proved by an affidavit in the possession of your committee. But in point of fact, they say the Genesee river opposite these lots, was never a public highway.

In 1813, a law was passed, declaring the Genesee river a highway from the High falls southwardly; and at that time, the whole of the rapids and falls, from a point above these mill sites to the perpendicular descent in the river below, was called the High falls, and so it is designated in the original title of the one hundred acre tract, of which these mill sites are a part; and that the current of the river opposite these mill sites was so broken and rapid that no boat could pass it, and that the highway under said act and within its intent, commenced at a point south of these mill sites, and that before the erection of the aqueduct a dam was built in 1817, across the river at the head of the rapids and south of these mill sites, which precludes the idea of its being a highway, and besides if it was, that it was so only for the purposes of navigation and not for the purposes of the canal.

4. That the river is considerably narrower at a short distance both above and below the aqueduct, than it is opposite to the said mill lots; and that the logs, timber, ice, and other drift will follow the main current of the river, which will conduct it through some of the more eastern arches; and further, that the arches opposite to these mill seats were not built solely or mainly for the purpose of passing the water of the river, but for the purpose of supporting the trunk of the aqueduct in a more economical way than solid masonry would do, and to pass the water from the tail races of the mills on said mill lots; and that the facts stated in answer to the first claim set up by the Commissioners, are conclusive answers to this claim, inasmuch as the Commissioners have recognized by their own acts, the rights of the owners of said mill lots to build thereon; and also, the case of Meech & Chappell's mill, mentioned hereafter, is evidence that this fourth claim of the Commissioners is not considered by the board of appraisers well founded.

It appears that these matters were all submitted to the board of appraisers, and that they decided as to these mill sites, that the owners of them had no right to erect buildings thereon, and that any buildings erected thereon are nuisances, and liable to be removed as such, without any compensation therefor; and that the whole of the said mill lots and the mill yard south of them, were held in fee by the owners, but subject to the right of the State to have the water of the river flow over the said property, or in other words, that the owners had a fee in the land, without the right of using it. And for the injury to this fee so modified, they awarded the sum of fifty dollars as damages to the owner of each lot, for the extension of the appropriation beyond the "blue line;" and for that portion between the "blue line" and the canal, they awarded no damages.

The buildings upon these mill lots were all subsequently pulled down and removed.

After this award was made, and after the buildings were removed from said mill lots, the Canal Commissioners determined, instead of erecting a new aqueduct upon the site of the old one, to erect a new aqueduct across the Genesee river, at a point a little south of the old one, and in consequence some of the property appraised in Oct. 1834, was not wanted or taken for the use of the canal. But the seven mill seats above mentioned were wanted even for the new aqueduct, and were appropriated for that purpose without any new appraisement, except in the instance hereinafter mentioned. After it was determined to alter the site of the aqueduct, the appropriation of additional lands became necessary, and the same were subsequently appraised, under the act providing for the enlargement of the Erie canal. Under this new appraisement, the lands of Hervey Ely, William Fitzhugh and Jonathan Child were appraised and taken, and their lands were appropriated for that purpose, and the buildings thereon removed. The same question as to the binding force and effect of the "blue line," was presented in these cases as in the former, and it was decided in the same way, and the claimants were allowed no damages for lands or buildings between the "blue line" and the line of the canal.

The following is a summary of the facts in the case of each memorialist.

First. The case of Hervey Ely is stated as follows in the memorial:

"Your memorialist, Hervey Ely, states, that he did sometime in the year 1828, erect a large and valuable stone flouring-mill, on the said mill-race, immediately south of the present aqueduct, and that he widened the said race so as to extend the width thereof up to the said mill, and that he built in front of his said mill, and adjoining thereto, a large store-house for the accommodation of his said mill; that he was then the owner of the bed of the said race from the said present aqueduct, south 460 feet, and of all the lands between the said race and the centre of the Genesee river; and that he also owned several mill sites on the said race, south of the said flouring-mill, on one of which was standing a large double and valuable saw-mill, and on one of the other of which was a store-house owned by your memorialist; that the "*blue line*" run through a part of the last mentioned store-house, and a part of the said mill sites; that for the purpose of making the said new aqueduct, and enlarging the said canal, the Canal Commissioners set

part the said mill sites and other lands of your memorialist adjoining thereto, in all about 200 feet in length, and 100 feet in width; that the said saw-mill and the said other building on the said other mill sites were taken down and removed by the direction of the said Canal Commissioners.

“The appraisers, in their award, say that the saw-mill with one single saw, and a large gang of saws, was capable of doing a large business; that two carpenters, witnesses, estimated the machinery of the mill at three thousand dollars, and the buildings and foundation at sixteen hundred and forty-four dollars, and the breast wheel at two hundred dollars. They say that some of the witnesses valued the ground between the flouring-mill and the saw-mill, at from \$13,000 to \$16,000, and the water power of eight run of stone, to the mill sites, at from \$8,000 to \$12,000, independent of the ground; and the building on one of the mill sites was proved to be worth \$500. The whole of which valuations amount to the sum of \$21,844. The appraisers appraised the whole of this property at \$7,125, thus appraising the property at \$14,719 less than the lowest estimate which had been made by the witnesses.

“In making this appraisalment, they rejected all the land east of the said ‘blue line,’ and also about one-half of the said building, standing on one of the said mill sites, for the reason that the ‘blue line’ run through it. Your memorialist insists that the whole of the rejection for the reason thus assigned, is altogether arbitrary and unjust, for the reasons herein before given, and in making the appraisalment for the remaining property, the estimate of witnesses was wholly disregarded, and which was so disregarded under the most frivolous pretences, as your memorialist conceives. And the first pretence is that your memorialist can use his water power on his other grounds. These water lots and their privileges were entirely separate from your memorialist’s other grounds, and what right had these appraisers to say that he shall use it on other grounds. Besides, they admit the saw-mill was a very valuable one, and every intelligent citizen of Rochester knows that a saw-mill of the description of the one taken by the Commissioners, is very profitable, and although the water belonging to these sites, might be drawn from them in time of low water to your memorialist’s other machinery, yet for the greater part of the year, there is a surplus of water which might have been used to great profit and advantage in the saw-mill, and which would be perfectly useless to the other machinery at such times.

“ Another pretence was, that the \$21,844, the lowest estimate set by the witnesses upon the property taken, is many times beyond the price paid for the same by your memorialist, between the years 1826 and 1829; and that as the witnesses testified that they had not known of any recent transfer of water power upon the race, they say it is worthy of their inquiry whether the increased estimate has not been occasioned by the contemplated project of widening the canal, and if so, that the State ought not to pay such advance. Now, it is known to all business men in the city of Rochester, that mill privileges in and about that city have advanced in value from 1826 and 1829, and sometime before the project of widening the canal was contemplated, to at least three times its estimated value, in either of the years before mentioned.

“ The third pretence is, that your memorialist owns a large flouring mill, and that the widening of the canal will afford your memorialist facilities, and render the expense of getting wheat to the mill and flour to market, much less, and that your memorialist will derive considerable advantage from these causes. And that he will share with the grower and the consumer the benefit arising from the enlargement of the canal. Now it is obvious, that if this proposition be just and true, that then it will be just that all the growers and consumers should contribute to the loss which your memorialist will sustain. But this supposed benefit is in a great measure imaginary, and is not susceptible of any definite calculation. And your memorialist conceives that it was never intended that these appraisers should be authorized, or left to make deductions from the estimated value of property, dependent altogether upon the mere conjecture of the appraisers.

“ *Second.* Your memorialists, Jonathan Child and William Fitzhugh, say, that they owned a lot of land south of and opposite to the west end of the aqueduct; that they had leased this lot for fifty years; that your memorialist, Jonathan Child, had purchased the said lease; that there was a bridge erected over the canal for the horses to pass over on the aqueduct south of this bridge, and adjoining to it there was a strip of land of about eight or ten feet wide, for the horses to turn upon, so as to go on to the bridge; this strip of land was enclosed by an iron railing; that your memorialist, Jonathan Child, erected on the said lot a large tavern house; that the north part of the main building of the house was distant about six feet from the iron railing, and that the platform at the piazza front of the house, adjoined the railing. This iron railing formed a complete separation between the said canal and the said lot of land;

that your memorialists at the same time owned lot No. 3, south and adjoining the said canal, and which was separate from the said aqueduct lot by a street; that they also owned lot No. 2, south of and adjoining the said canal, and which was separated from the said lot No. 3, by the water passage into Exchange slip; that the Canal Commissioners, preparatory to the making of the new aqueduct, and in taking land for the use thereof, by the survey for that purpose, included these three lots, together with the said aqueduct house, in such survey; that soon after they had so surveyed the said land they sold the said aqueduct house, and that the same was removed before the same was appraised; that the said 'blue line' included therein about one-fourth of the said aqueduct house; that the appraisers proceeded to appraise the property so taken; that the said house was valued by witnesses, and admitted by the appraisers, to be worth the sum of three thousand one hundred and forty-five dollars, but the appraisers decided that as about one-fourth of the said house was within said 'blue line,' that the land on which that fourth stood belonged to the State, and that therefore it was a trespass in putting the said building on the same, and they accordingly deducted about one-fourth of the value of the said house from the said appraisal, and gave to your memorialist by said appraisal, about three-fourths of said valuation, and this under the pretence that the land within said 'blue line' belonged to the State, in opposition the testimony of Myron Holley, given in this case, and herein before referred to, and to the clear practical location of the canal, and with which the aqueduct house did not in any manner interfere. And your memorialists further state, that the said appraisers claimed about one-third of the said aqueduct lot as being within the said 'blue line,' and belonging to the State; they therefore refused to make any allowance for that third, and the said 'blue line' cut off parts of the said lots No. 2 & 3, for which the appraisers refused to make any allowance, and they then proceeded to make the following appraisements.

To the said Jonathan Child for the aqueduct house,.....	\$2,358 75
For the present value of his lease on lot No. 4, on which said house stood,.....	597 76
For his half of the reversion of said lot,.....	701 02
For his half of lot No. 3,	1,500 00
For his half of lot No. 2,	1,350 00
For the losses of rent on aqueduct house,.....	180 00
For old house on lot No. 3,.....	20 00
	<hr/>
	\$6,707 73
	<hr/>

To William Fitzhugh, for half of the reversion on lot

No. 4, on which aqueduct house stood,.....	\$701 02
For his half of lot No. 3,	1,500 00
For his half of lot No. 2,.....	1,350 00
	<hr/>
	\$3,551 02
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“And your memorialists further state, that there were originally laid out south of the present aqueduct, and east of the mill race, seven mill sites, which were before the appraisement of the said aqueduct lot, and lots No. 1, 2 and 3, taken for the use of the State; that a mill yard had been laid out in front of these sites; that on the south side of the mill yard, there were three lots for dwelling houses laid out adjoining the said mill yard; that there was no access to or from these lots except through this mill yard; that this mill yard was entirely separated from the said aqueduct lot, and from the said lots Nos. 2 and 3 by the mill race, and had no connection with each other; that on one of the three said lots for dwelling houses, there was a dwelling house, and actually occupied by the owner of the said lot and his family; that the appraisers, after having appraised the aqueduct lot and house, and the said lots, Nos. 2 and 3, undertook to decide, and did decide, that as the mill sites were taken by the State, the said mill yard was useless as an appurtenant to the mill sites, and that the same had reverted to the original owners, of which your memorialists were two; and that the owners of the said lots adjoining the same, had no right to a passage across this mill yard, or to the light and air which they would have enjoyed if the said mill yard had been left open and unappropriated; and thus determining the title, not only to the said mill yard of your memorialists, but of the easements of owners of lots adjoining thereto, and accordingly they proceeded to estimate the value of the said mill yard, and fixed the same at six thousand dollars, and deducted the one-third thereof, being two thousand dollars from six thousand seven hundred and seven dollars and seventy-three cents from the said appraisal, so as aforesaid, made in favor of your memorialist, Jonathan Child, leaving for him, for the whole of his said property, only the sum of four thousand seven hundred and seven dollars and seventy-three cents: And they also deducted one other third of the said estimated value of the said yard from the amount of the appraisement which they had made by a separate appraisement about the same time on two lots owned solely by your memorialist, William Fitzhugh.

“And now, your memorialists insist that the said appraisers had no right to decide the title of the said mill yard, either of your memorialists

or any other person: and especially, to land entirely separate from that which they were called upon to appraise; and they insist further, that the appraisers had no power under the act which authorized them to appraise, to offsett any advantages which your memorialists might derive from the taking up of the said mill sites. The 46th section of the act which declared the manner in which appraisements shall be made, declares: 'that it shall be the duty of the appraisers to make a just and equitable estimate of the damages and benefits resulting to the persons intrusted in the premises from the *construction* of the work, for the purpose of making, which such premises should have been taken.'

"This section is taken from the act of 1817, which was passed before the canal was made. The word '*construction*,' here, means the construction of the canal. The benefit which the canal appraisers supposed to result to the owners of the mill yard, was not from the *construction* of the canal, or even of its enlargement; but it resulted, according to their own view of it, from the taking up of the mill sites, and the reverting of the mill yard; the deduction, therefore, of the estimated value of the mill yard, from six thousand seven hundred and seven dollars and seventy-three cents, was an arbitrary and unauthorized act, and so was the deduction made from the appraisement of the said two separate lots of your memorialist, William Fitzhugh."

Third. As to the case of Thomas Kempshall:

This memorialist was the owner of one of the said mill lots herein before mentioned, with a valuable gang saw-mill thereon, and a water power attached thereto, the north end of which saw-mill was about twenty-five feet from the aqueduct. The Commissioners took down and removed the said saw-mill, and appropriated the said lot, and a part of the mill yard which was attached to said mill lot as an easement, and took possession of all said premises. Mr. Kempshall put in a claim of damages before the board of appraisers, and proved by several witnesses that the value of said lot, with its building and water power, was about the sum of four thousand, five hundred dollars; and that the board of appraisers allowed him therefor, only the sum of fifty dollars; and that in making the said award, the board adopted substantially the arguments and reasoning of the counsel for the Canal Commissioners, as herein before set forth in relation to said mill lots.

Fourth. As to the case of Joseph Strong and Maltby Strong:

These memorialists, together with Henry B. Williams, were the owners of one of said mill lots, and the same herein before stated as

having belonged to Carpenter and Sibley, upon which was a saw-mill, with a water power of four run of stones attached thereto. The Commissioners took down and removed said saw-mill, and appropriated and took possession of the said lot, and a part of the mill yard which was attached to said mill lot as an easement. The owners presented their claim to the said board of appraisers, for the damages which they had sustained for the destruction of said mill, and the appropriation of said lot. The whole property was proved to be worth three thousand dollars, and the board of appraisers allowed only the sum of fifty dollars, for the same reasons which governed them in the case of Thomas Kempshall, above mentioned. Henry B. Williams has since assigned all his interest in the claim for damages arising out of the taking of this lot, to Joseph Strong and Maltby Strong.

Fifth. As to the case of John T. Potter:

This memorialist owned one of the said mill lots, upon which was erected a saw-mill, with a water power of four run of stones attached thereto. The Canal Commissioners took down and removed the said saw-mill, and appropriated and took possession of the said lot, and the portion of the mill yard attached thereto as an easement. The owner presented to the board of appraisers a claim for damages, for the destruction of said mill and appropriation of said lot, and proved before the said board that its value was about four thousand dollars; and the said board awarded this memorialist also, only the sum of fifty dollars, for the same reasons which governed their award in the two preceding cases. In this case the memorialist represents that his whole property was invested in this mill lot and the saw-mill thereon.

In all these cases the board of appraisers refused to allow any compensation for the land or buildings, or any portion of the land or buildings between the "blue line" and the line of practical location of the canal. And in the case of the mill lots the board of appraisers refused to allow any thing for the lots or the buildings thereon, under the plea that they had been before appropriated by the State, and that the buildings thereon were nuisances; and the little compensation they did allow was a nominal sum, for a fee which they decided could not be beneficially used by the owners. In relation to these mill lots, there is however one striking exception presented in the memorial. In October, 1834, Benjamin Campbell owned two of the said mill lots, situated, in relation to the aqueduct, in all respects like the other lots; upon these two mill lots there was erected a large stone flouring-mill. Mr. Campbell presented his claim for damages to the board of appraisers, at

the same time with the other claimants, and his claim was decided upon in the same way, and upon precisely the same reasons, as the claims for the other mill lots. Mr. Campbell was allowed merely the same nominal sum; and his lots and mills were claimed to belong to the State.— Before however this mill was torn down and removed, the Commissioners had decided to alter the site of the aqueduct, as herein before mentioned. The new site would require the whole of Mr. Campbell's two lots to be appropriated. After the appraisement above mentioned, Mr. Campbell sold his mill and mill lots to Meech and Chappell, for the sum of \$20,000. Upon the site of the aqueduct being changed, the new owners of these lots applied to the canal appraisers to have the damages for taking the said mill and lots, appraised again. The appraisers did make such new appraisal, and awarded to Meech and Chappell the sum of \$23,500, as their damages for the appropriation of said mill and lots; and the said sum was fully paid to them, notwithstanding the appraisers had, on the first hearing, when the property was owned by Mr. Campbell, decided that these lots belonged to the State. In relation to this circumstance, the memorialists very justly say: "These appraisers must have either changed their opinion, which they so solemnly pronounced as unquestionable, or they must have given this large sum of money to Meech and Chappell, for property to which they had no right or claim. If they had changed their opinion, then, in candor and justice, they ought to have apprised your memorialists of it, and to have reviewed the appraisal of the property of your memorialists; and if they had not changed their opinion, then they have done palpable injustice to the State."

The memorialists deem the decisions in their cases inconsistent with the decisions in the other cases, not only in this respect, but in several others.

1. In the case of Hervy Ely, the appraisers referred to the cost of his property in 1828 and 1829, as the proper rate of value. In the case of Meech and Chappell, the appraisers gave them an advance of \$3,500 after they had owned it only a few months. They gave Meech and Chappell at least the full value of their property, which they do not do in the case of the other memorialists.

2. In the cases of all the other memorialists, the appraisers allow nothing for lands within the "blue line," whereas the "blue line" cut Meech and Chappell's property in precisely the same manner that it does the other mill sites, yet they allow Meech and Chappell the full value

of their property up to the line of the canal, without any regard to the "blue line."

3. In the case of Thomas Kempshall, John T. Potter and others of the memorialists, they purchased their mill sites long before the lands were appropriated, for a large and valuable consideration, and without any notice or suspicion that there was any claim or pretence of claim to the same on the part of the State, yet the appraisers in their cases decided that the State owned the property. Meech and Chappell purchased their property after this decision of the appraisers, and consequently after full notice of the claim of the State, and the appraisers allowed them the full value of the property.

The memorialists deem the decisions of the appraisers in each of these cases unjust, and insist at any rate that they have a right to have one uniform rule or principle applied to different cases when the circumstances of each are similar, and that this has not been done; and they complain that the decisions in these cases are not only erroneous but inconsistent with the decisions in precisely similar cases. The memorialists deemed it hopeless to appeal from the decision of the appraisers to the Canal Board, as by law they might have done, inasmuch as in most of their cases one of the members of the Canal Board was himself a member of the board of appraisers, and another was counsel for the Commissioners, and urged successfully the principles upon which the award should be made. They supposed that these two members of the Canal Board having themselves fully examined the cases, and taken ground in relation to it, would be able to urge their opinions successfully upon the Canal Board, and prevent any change in the award.

The time for appeal allowed by law has long since elapsed, and the memorialists ask relief at the hands of the Legislature. They ask that their property may be again appraised by new appraisers to be selected from the vicinity of the property, and that they shall have the privilege of choosing one of them. They also ask for an alteration of the law relating to the appointment of canal appraisers, in such manner that the owners of property may in all cases have some agency in the appointment of such appraisers, and that the act in relation to the map of the canals, so far as it declares such map presumptive evidence in all cases, may be repealed, or so modified as to be confined to the actual original location of the said canal, without regard to such map.

Your committee are not prepared to recommend at present any alteration in the law relating to the appointment of the canal appraisers,

nor will they suggest any modification of the law in relation to the canal map, until that law shall have received a judicial construction hostile to the interests of owners on the line of the canals. The committee incline to the opinion, that the construction of this law made by the board of appraisers, as represented by the memorial, and indeed as appears by their decision, is erroneous, and they cannot but believe, if an opportunity should be afforded, it would receive a judicial construction of a different character. Some such law is absolutely necessary for the interests of the State. It was not contemplated that it would work any injustice upon its passage, and it is not now believed by the committee that it will do so upon a sound and fair construction of it.

Neither can the committee think that it is proper in the individual cases of these memorialists, to allow them a special board of appraisers for their particular cases. The law furnishes a general rule for the ascertaining and settlement of damages for lands and property taken for the canals, and this rule cannot with propriety be altered to meet an individual case. It would be a dangerous precedent to do so; as if such a precedent should be once set, every individual considering himself aggrieved would apply for a special board of appraisers in his case. The mode of appraisal now existing should be applied to all cases, or if altered, should be so altered as to apply to all future cases; and, as we have suggested before, we are not prepared to recommend a general alteration of the law.

The cases of these memorialists however involve many questions both of law and of fact,—questions upon which this committee should not decide, but which they are willing to have decided by a proper tribunal, before whom both parties can appear and produce their proofs. We believe the memorialists have made out a case, upon which, in justice and equity, they are entitled to have a re-hearing. The inconsistency of the decisions of the canal appraisers upon different cases which are attended with precisely the same circumstances, and should therefore be governed by the same rule, would of itself entitle the memorialists to a new trial. Without deciding which of the decisions of the appraisers is right, we are willing to give the memorialists the benefit of a new hearing. This new hearing should in our opinion be had before the board of canal appraisers, as now constituted by law, where the facts of the case may be made to appear by proper legal proofs, and where the law bearing upon the case may be discussed. From this tribunal there will lie an appeal to the Canal Board, where both the facts and the law may be passed upon. If either party is dissatisfied with the decision of this Board as

to the law, and there is no mode of carrying the question before the judicial tribunals of the State, we cannot perceive any impropriety in hereafter providing by law for carrying such questions before our courts for adjudication.

Your committee have prepared a bill to carry into effect the above suggestions, which they ask leave to introduce.

No. 285.

IN ASSEMBLY,

March 7, 1839.

REPORT

Of the Superintendent of Common Schools, on reference from the Honorable the Assembly, of the petition of sundry inhabitants of Darien, Pembroke and Alexander, Genesee county, relative to the preservation, &c. of school district libraries.

The Superintendent of Common Schools, to whom was referred by the honorable the Assembly, the petition of sundry inhabitants of the towns of Darien, Pembroke and Alexander, in the county of Genesee,

RESPECTFULLY REPORTS:

The petitioners allege that there is no legal provision for securing the books belonging to school libraries, and that, in consequence, many districts consider it inexpedient to purchase libraries; and they pray for the passage of some law on the subject, and particularly that authority may be given to trustees of school districts to sue for, and recover the value of books lost or destroyed, and for injuries done to books. The Superintendent regrets being obliged to state, that he has received numerous letters from various parts of the State, making similar complaints to those made by the petitioners, of books being carelessly injured or destroyed, or wantonly retained by the borrowers, and expressing great apprehension that the libraries already purchased, will soon entirely disappear, unless some effectual means are taken to preserve them. The experience of all who have been engaged in the establishment of public libraries in our villages and towns, will sustain the remark, that after the novelty of such institutions has subsided they have generally fallen

into decay, and their books become scattered or irretrievably lost. Considerable observation induces the belief that this has arisen from the want of provisions for securing the responsibility of those having charge of the libraries, and their accountability for neglect of their duties. At present, the extent of the authority of trustees of school districts over these libraries is very doubtful. It would be unjust to cast responsibility on them, without giving them the means of protecting themselves and the trust committed to their charge. Hence, some control by them over the libraries seems indispensable. It is equally so, to preserve the books from injury or loss by carelessness, neglect or cupidity. The mere authority to prosecute for the value of such books, or the amount of injury they sustain, as proposed by the bill introduced into the honorable the Assembly, and transmitted with the petition, may be attended with the consequence of affording opportunities for petty litigation, which will soon embroil a neighborhood, and produce the most disastrous effects. It is believed that a system of general regulations may be framed respecting the use of the books, and prescribing the fines and other penalties that may be imposed for injuring or not returning them; and adding to this a provision analagous to that which exists in the common school act, permitting appeals to the Superintendent, and rendering his decision final, will, in almost all cases, practically operate as it has in respect to the schools, to prevent litigation. Still, the law must be called in to enforce the collection of the fines; but under such a system, the occasions for suits would be very few, and the suits themselves would be very simple and would furnish little opportunity for controversy. We have had so much experience of the working of a nearly similar system in the school department, that we should be justified in the expectation that it would be equally effectual in relation to libraries.

There are other topics connected with school libraries which the present occasion furnishes the opportunity of introducing; as it is desirable that all the enactments on the subject should be in one bill. Application has been made to the Superintendent for his direction or advice, in relation to two or more districts forming a joint library, by the union of their funds, for the use of the inhabitants of such districts. It is urged that there are two districts in the case alluded to, in one village, where one library would be equally convenient to all the inhabitants; and that by having only one, the expense of duplicate books would be saved, and the library rendered more extensive and more useful. The present law does not authorize such a union. The Superintendent, however, is of opinion that there may be many cases where

such a union would be very desirable, and would promote essentially the great object of establishing these libraries, although there might be cases where it would be improper. It is submitted, whether a discretion might not be vested in the Superintendent, or some other officer, to allow such joint libraries to be formed in cases where they seem proper.

The existing law makes no distinct provision for the disposition of the library money, that may be apportioned to a town or district which it may not be entitled to receive, in consequence of neglect to raise a similar amount, to expend the sum received, or to report the expenditure. The amount thus withheld may perhaps be mingled in the mass of the next year's money, and distributed among all the districts, or it may be given to the defaulting district. Considering how recent the system is, and the difficulty of having it understood thoroughly at first or strictly executed, it would seem severe to deprive districts, in all cases, of the money apportioned to them; while there will undoubtedly be cases of such gross neglect, or wilful violation of duty, as to render the withholding the amount forfeited, just and equitable to all parties. A provision vesting a discretion similar to that now exercised under the school laws, in relation to school moneys withheld on account of defective reports, or involuntary omissions to make any, is respectfully recommended, as being well adapted to the exigency.

The present law, appropriating money for school libraries, leaves it discretionary with the inhabitants, after the year 1841, to apply those moneys to other purposes. Considering the great additions annually making to the capital of the common school fund, its rapid accumulation by those additions, and the operation of compound interest on them and the surplus of the revenue beyond the sum annually apportioned, it is quite obvious that the library moneys will not be wanted for school purposes; and it is respectfully submitted, whether the period during which those moneys should be exclusively devoted to the purchase of books, should not be extended. Such an extension will materially influence publishers and authors, in the preparation of suitable books, while it will stimulate the exertions of the inhabitants of school districts to form libraries, and enable them to select their books upon a more enlarged plan. Standard works in different departments of literature and science will thus be more likely to be placed in these inestimable repositories for instruction.

Applications are frequently made to the Superintendent for advice in the selection of books for district libraries, and to select them. Appre-

hending that such advice, coming from an official quarter, might be construed as an improper interference, the Superintendent feels some difficulty in giving it without being authorized by law. He submits to the Legislature whether such sanction shall be given.

In order to exhibit, practically, the views herein presented, the Superintendent has drawn up a bill, as the most convenient mode of exhibiting the details supposed to be necessary, which he respectfully submits herewith, as a part of his report.

It is proper, upon concluding this report, to state, that the school district library system is received with great and increasing favor by our fellow citizens. It is known that more than seven hundred libraries were purchased before the close of navigation the past year, and it is believed that three thousand would have been procured, if they could have been supplied.

There can be no doubt that the system is destined to produce great results, either for good or for evil. We have every reason to hope and believe, that they can be no other than most auspicious to the best interests of the whole people. The libraries are, in themselves, an important part of the great system of education which is to prepare the rising generation for the duties which, under our republican institutions, devolve upon every citizen. To a great extent, they will produce the same result upon those who are now exercising the rights of citizenship; and the poor man who has been hitherto denied access to the treasures of science and of literature, will find in the books which his children bring home from the district libraries, new sources of happiness, new reasons for admiring and loving the democratic principles of our governments, and new incentives to a conscientious discharge of the duties, upon the faithful performance of which, alone, under providence, those principles depend for their preservation entire and uncontaminated.

At the commencement of such a system, it is exceedingly important that it should begin right, and that as little opportunity as possible should be left for the formation of erroneous and irregular habits in its administration. While much must, and ought to be left, to the intelligence of the people, much also may be done to guide those unacquainted with the subject and inexperienced in conducting such institutions. Regularity and order may thus be more easily introduced at first, than after erroneous practices have obtained a foothold. Feeling a deep solicitude for the success of this great undertaking, the Superintendent can only

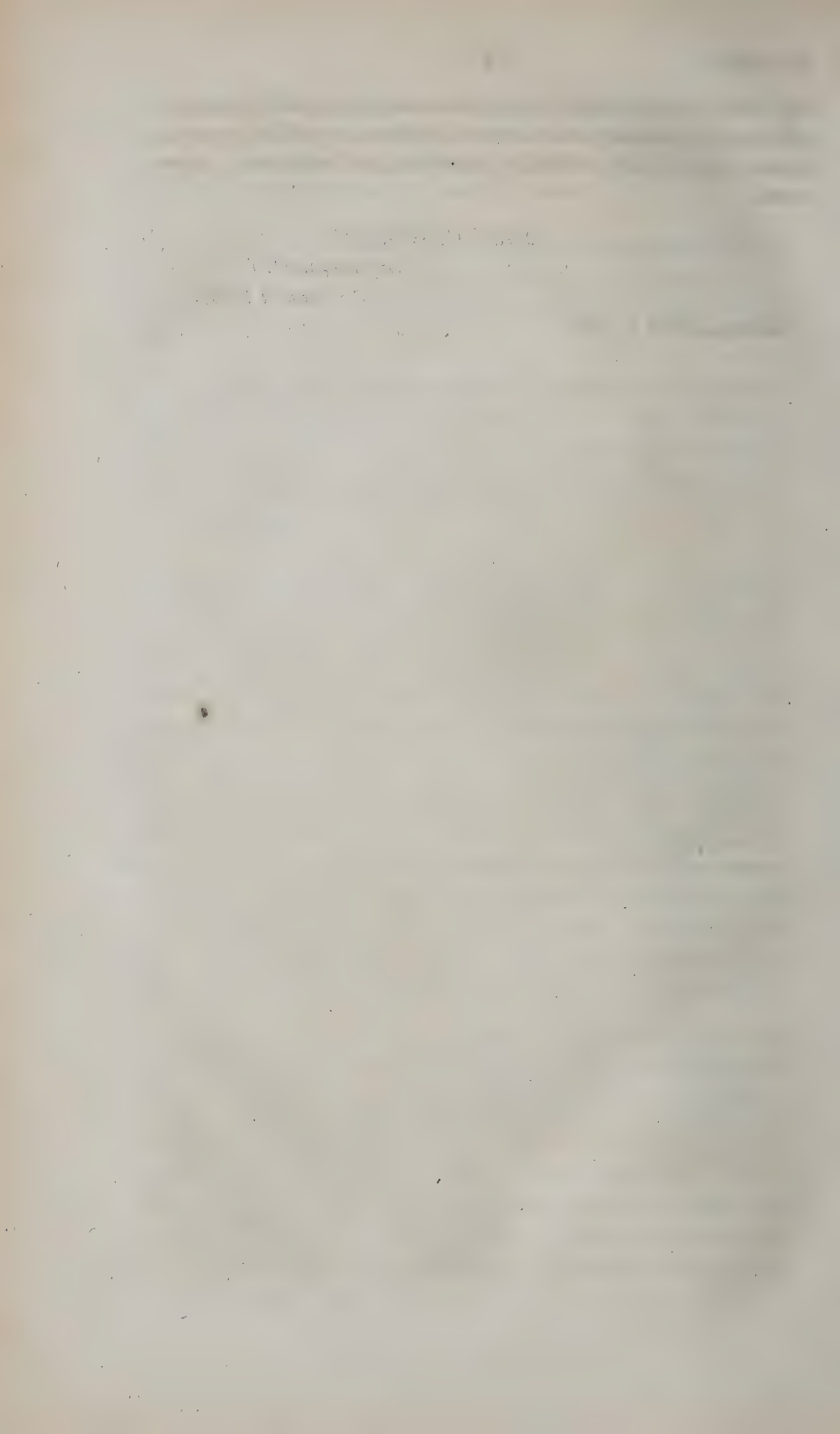
say, that the labors and duties which the accompanying bill proposes to cast upon him, and any other that the Legislature may think proper to impose, will be most cheerfully undertaken and assiduously prosecuted.

JOHN C. SPENCER,

Superintendent of

Common Schools.

Albany, March 6, 1839.



IN ASSEMBLY,

March 7, 1839.

BILL

Accompanying the report of the Superintendent of Common schools, on the petitions of sundry citizens of Genesee county, relative to the preservation of district school libraries.

AN ACT

Respecting school district libraries.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows :

§ 1. The trustees of every school district shall be trustees of the library of such district; and the property of all books therein, and of the case and other appurtenances thereof, shall be deemed to be vested in such trustees, so as to enable them to maintain any action in relation to the same. It shall be their duty to preserve such books and keep them in repair; and the expenses incurred for that purpose, may be included in any tax list to be made out by them as trustees of a district, and added to any tax voted by a district meeting, and shall be collected and paid over in the same manner. The librarian of any district library shall be subject to the directions of the trustees thereof, in all matters relating to the preservation of the books and appurtenances of the library, and may be removed from office by them for wilful disobedience of such directions, or for any wilful neglect of duty; and whenever they shall have reason to apprehend the loss of any such books, or their injury, or destruction by his misconduct; and whenever a vacancy shall exist in the office of librarian, the same shall be supplied by the trustees until the next annual meeting of the inhabitants of the district.

§ 2. Trustees of school districts shall be liable to their successors for any neglect or omission, in relation to the care and superintendence of district or joint libraries, by which any books therein are lost or injured, to the full amount of such loss or injury in an action on the case, to be brought by subscriptions in their name of office.

§ 3. A set of general regulations respecting the preservation of school district libraries, the delivery of them by librarians and trustees to their successors in office, the use of them by the inhabitants of the district, the number of volumes to be taken by any one person at any one time or during any term, the periods of their return, the fines and penalties that may be imposed by the trustees of such libraries for not returning, losing or destroying any of the books therein, or for soiling, defacing or injuring them, may be framed by the superintendent of common schools, and printed copies thereof shall be furnished to each school district of the state, which regulations shall be obligatory upon all persons and officers having charge of such libraries, or using or possessing any of the books thereof. Such fines may be recovered in an action of debt, in the name of the trustees of any such library, of the person on whom they are imposed, except such person be a minor; in which case they may be recovered of the parent or guardian of such minor, unless notice in writing shall have been given by such parent or guardian to the trustees of such library, that they will not be responsible for any books delivered such minor. And persons with whom minors reside shall be liable in the same manner, and to the same extent, in cases where the parent of such minor does not reside in the district.

§ 4. Any person conceiving himself aggrieved by any act or decision of any trustees of school districts, concerning district school libraries or the books therein, or the use of such books, or of any librarian, or of any district meeting in relation to their school library, may appeal to the superintendent of common schools, in the same manner as provided by law in relation to common schools, and his decisions thereon shall be final.

§ 5. The legal voters in any two or more adjoining districts may, in such cases as shall be approved by the superintendent of common schools, unite their library moneys and funds as they shall be received or collected, and purchase a joint library for the use of the inhabitants of such districts, which shall be selected by the trustees thereof, or by such person as they shall designate, and shall be under the charge of a librarian to be appointed by them; and the foregoing provisions of this act shall be applicable to the said joint libraries, except that the property in them shall be deemed to be vested in all the trustees for the time being of the districts so united. And in case any such district shall desire to divide such library, such division shall be made by indifferent persons, to be appointed by the superintendent of common schools.

§ 6. The moneys directed to be distributed to common schools by the fourth section of chapter two hundred and thirty-seven of the acts of 1838, shall be applied to the purchase of books for a district library for the term of five years; and the said moneys shall be distributed to the school districts in the same manner and proportions as the public school money, and upon the like terms and conditions in all respects. And if by reason of non-compliance with such conditions, any library money shall be withheld from any school district, the same may be dis-

tributed among other districts complying with such conditions, or may be retained and paid subsequently to the district from which the same was withheld, as shall be directed by the superintendent of common schools, according to the circumstances of the case.

§ 7. The superintendent of common schools, whenever requested by the trustees of a school district under the directions of the legal voters of such district, may select a library for their use, and cause the same to be delivered to the clerk of the county in which such district is situated, at its expense. He shall transmit a sufficient number of copies of this act, to supply each school district in the state, with forms and instructions for its execution, to the clerks of the respective counties, who shall forward the number directed to each school district in his county to the clerk thereof.

IN ASSEMBLY,

March 7, 1839.

REPORT

Of the committee on privileges and elections, on several memorials in relation to betting on elections.

Mr. T. B. Cooke, from the committee on privileges and elections, to which was referred the memorials of "members of the association of Fairfield academy, for the promotion of good morals; of sundry inhabitants of Saratoga Springs, and of Milton, county of Saratoga;" having had the interesting subject submitted to them under consideration,

REPORTS:

The memorialists invite the attention of the Legislature to a practice of threatening, increasing and alarming evil. They represent the "staking of money upon the result of our political elections, not only in itself morally wrong, but as a chief source of corruption at the polls;" and express a belief, that upon the free and independent exercise of the elective franchise depends the soundness and stability of our political system, and the perpetuity of our civil liberties; and therefore pray, that by Legislative enactment, all persons guilty of such offences may be deprived of their suffrages, and rendered ineligible to any civil office for a term of years.

Your committee do not hesitate to denounce the practice complained of by the memorialists, as fraught with the most dangerous consequences to the republic, by the prostration of the morals of our citizens. No species of gambling tends in any comparative degree so to sap the foundation of our republican institutions. The information obtained by your committee excites in their minds the most fearful apprehensions.

They have no reason to doubt the fact, that many cases have occurred of large sums being staked for the express purpose of dividing the amount, in case of success, between several individuals, who, of course, hazard nothing, but in case they succeed, severally obtain the share allotted them, and thus many have been rendered most boisterous and violent in support of their favorite candidates, while others have been corrupted and induced to vote for candidates their judgment disapproved. One thousand dollars thus staked, being divided among one hundred men, gives to each the sum of \$10, about equal to the amount paid for the labor of one month at the season of the year when our elections occur; thus one hundred corrupted and unprincipled men are thrown upon the community, hurried on, not only by the violence of party spirit, a power more potent than that of steam, but also by the corrupting influence of money—a bribe—and what may not such a phalanx accomplish, even in the space of one week, in any of our counties?

Your committee have reason to believe such cases have occurred, and that much has been accomplished at our polls by this altogether the cheapest and most efficient mode of electioneering, and by success thus obtained, there has been cast upon the defeated party, all the expense necessary to the accomplishment of such defeat.

Your committee would not exhibit a more gloomy picture than truth requires; nevertheless, they deem it a duty, in some degree at least, correctly to present the subject submitted to their consideration, and to open the festering wound which threatens to corrupt the very vitals of public morality, and the overthrow of our valued institutions. They are persuaded that the practice complained of by the memorialists, is the fountain from which flows many bitter and corrupting streams. They believe, that from this species of gambling, many have passed to direct and positive bribery, covered, in some cases perhaps, by a proposition to give employment for a specified number of days, always including the three days of election, for a certain stipulated extravagant sum, the employed to perform whatever service may be required, circulating ballots and voting always included. One instance is believed to have occurred of a father and two sons having been paid sixty dollars for the three election days service, all to exert their influence and to vote for candidates whose political principles they disapproved, and what is most alarming is the fact, that necessity is now urged as a plea in justification of the practice.

Your committee, though reluctant, are constrained to believe that many otherwise moral and valued citizens, perhaps with a view to count

effects of similar measures already adopted by their opponents, under the baneful influence of party spirit, have yielded to what circumstances to them appeared to require; while others, with reckless desperation, whose sole aim is the gratification of the same unhallowed ambition which inspired the first of our race with a desire to become as gods, and drew them from their allegiance and hurried them on to open rebellion against their Maker, in utter disregard of all consequences, at once resort to open and direct bribery. If we look back upon the primeval purity of our elections, those of us who recollect the organization of our government, and the early practices under it, cannot fail to regret the change; then was it about universally the object to select the most suitable and competent men for office, nor could others hope for place and power. The result we witness, and the blessings secured, we now enjoy. Who has not the discernment to perceive that our present condition must have been wretched indeed, contrasted with what it now is, had the present practices prevailed from the organization of our government? What then are we to transmit to our posterity? The wisdom and virtue of our early, pure and patriotic sages directed them to the organization of a government such as the world had not before known, by which civil and religious liberty was fully secured, together with every privilege good citizens can desire; from chaos and wretchedness came order and prosperity—the natural and certain products of wisdom and virtue; these individuals cheerfully submitted to almost any sacrifices to promote public prosperity. May it never be written as our epitaph, “These degenerate sons of such sires, by corruption, fraud and ambition overthrew the fair fabric, and thus blasted the world’s last hope of the perpetuity of republican institutions.” And here it is proper to acknowledge the interposition of infinite wisdom, for this improvement in the science of government was not the result exclusively of human discernment, as fully appears from the facts that few, and probably not one individual member of the Convention, altogether approved the Constitution they, by compromise, agreed to recommend to the people of the United States for their adoption, as the best in which they could unite, and in that, only by much mutual concession; and to this they were forced by threatening dangers. Each of the thirteen States was an independent sovereignty—poor and feeble; union, which is strength, was indispensable, not only for defence, but to obtain confidence and establish credit, on which every hope of maintaining the independence they had achieved, and of securing prosperity to the country, was suspended; and thus, by a most extraordinary combination of circumstances, providentially indeed, but in which we discover much human wisdom

and prudence, was brought into successful operation the most stupendous system of government ever devised for man. The great and important question now arises, how shall we secure its perpetuity and transmission to posterity? Your committee do not hesitate to reply, nor do they entertain a doubt upon the subject, this system, as viewed by your committee, so important, not only to our country, but the world, can be sustained only by intelligence and virtue, and the more of those required for its perpetuation, the more confidence may we repose in its importance and superiority.

It is with regret and much fearful apprehension, your committee record the fact that many practices have obtained, which in the early days of the republic would have united, perhaps, every voice in proclaiming their authors unworthy of public confidence.

Whence this change? Your committee are persuaded many evils result from a blind adhesion to party, with a determined opposition to such measures as are proposed by opponents, and support of all recommended by political associates, without regard to the character of the measures themselves, or their tendency; and that much is chargeable to those whose condition entitles the public to demand from them a better example. The intelligent, and those who occupy prominent stations, must exert an extensive influence; if that be deleterious, its effects must be extensively pernicious. The subjects submitted to the consideration of your committee opens a broad field, the object of the memorialists being two-fold, viz: the suppression of immorality, and to secure the stability and perpetuity of our political system. To do justice must require volumes. The practice of staking money on the result of elections, although of serious import to our institutions, yet it stands not alone, nor is it deemed more fatal in its effects than many other prevailing practices; therefore, to present a full view of the subject, your committee must explore the whole ground; they must search out the vices of the age, and trace them in their various ramifications; for not one of the whole catalogue but tends directly to the prostration of our system, which rests solely upon the intelligence and virtue of our citizens.

The desecration of the Sabbath, intemperance with its train of evils, &c. &c. all conspire to subvert our government, and blast our fair prospects—our hopes.

To accomplish the important objects the memorialists have in view, much is to be performed, and yet it is practible; nor would your committee discourage the attempt, for they are fully persuaded that a radical

change—a thorough reformation—is all that can save us from the vortex which has successively swallowed up all former free governments; despotism alone can exist amidst vice and corruption.

If we would perpetuate, and transmit unimpaired, to posterity, our civil and political institutions, we must return to more virtuous habits; we must select with great caution those to whose hands we commit power; we must, without regard to party, approve good and condemn bad measures; we must enact salutary laws, and they must be respected. By legislative enactments alone, however, the great object will never be secured;—ignorance never sustained liberty nor liberal institutions; nor has a people of corrupt morals ever observed moral laws. Our laws are but the will of the people, nor can other than those corresponding with that will be enforced; therefore, all must depend on the intelligence and virtue of the people themselves. Hence your committee arrive at the conclusion that your memorialists are correct in representing the soundness and stability of our political system, and the perpetuity of our civil liberties, as depending on the intelligence and virtue of our people, and the free and independent exercise of the elective franchise. It then necessarily follows that our common schools, as also our higher literary institutions, demand every attention—our people must be instructed; for if they degenerate—if they become ignorant and vicious—our government becomes, sooner than may be anticipated, a mobocracy; anarchy will prevail, from which to despotism the transition, though violent, is nevertheless certain.

The remedies proper to be applied for the correction of existing evils, and to prevent their increase, may be doubted. Nevertheless, your committee are fully persuaded there should be no further delay. They have considered the subject of a registry of voters, which some of us believe would produce salutary effects in other respects, if not in relation to the prominent evil complained of; and it is the opinion of a portion of your committee, that the third section of the second article of the constitution is imperative, and demands of the Legislature the enactment of some law of that character. With a view, however, to more perfect harmony in the committee, that subject has been dismissed, as also has been the subject of the infliction of all punishments more severe than fines, hoping the moral sense of the community may be awakened to impending dangers, and that patriotism may accomplish the important work.

Your committee ask permission to introduce a bill prepared in accordance with these views.

STATE OF NEW-YORK.

No. 287.

IN ASSEMBLY,

March 8, 1839.

REPORT

Of the Canal Commissioners, in answer to a resolution of the Assembly, of February 13, 1839.

The Canal Commissioners respectfully submit their report to the Assembly, in answer to the following resolution:

STATE OF NEW-YORK, }
IN ASSEMBLY, *February 13, 1839.* }

“ Resolved, That the Canal Commissioners be requested to report to this House as soon as practicable, all their proceedings, and all proceedings had under their authority or supervision in relation to the location of the lines of the Erie Canal, through the now city of Rochester; both of the original lines, with all alterations of the same, if any have been made; the lines of the enlarged canal, and particularly of what is, or has been by them termed the blue line, with a particular description of all these lines; and also the amount of damages appraised and awarded, with the mode and manner in which such appraisement or appraisements have been made, and damages awarded; and the general mode and manner of appraising damages for property taken for the use of the canals.

“ By order.

“ J. N. LAKE, Clerk.”

Neither of the present Commissioners had special charge of the line of the Erie canal, passing through the now city of Rochester, at the time it was located; they therefore cannot speak with much certainty in relation to the location. From the information they have obtained from reports on that subject, they conclude that a part of the line was located in 1819, and a part in 1820. They do not know that any alterations of the

[Assem. No. 287.]

original lines, were made previous to the construction of the canal.— In the year 1829, the canal was, by permission of some of the Canal Commissioners, enlarged on the north or berm side, near Exchange-street, and some docking and walling was put in by owners of lots; and some was also put in on the towing-path, or south side from east, to a considerable distance west of Exchange-street, by the superintendent of repairs. These alterations increased the width of water on the surface in some places, three feet; but it is believed that the base line, or inner edge of the towing-path, was not altered. That line now appears to be straight, opposite to where the enlargement took place. Cutting off the slope of the bank, and putting in vertical wall or docking, would increase the water-way, without varying the base line, or the line of the inner angle of the towing-path, from which the measurements were taken for making the maps of the canal.

To carry into effect part first, chapter nine, title nine, article first of the Revised Statutes, the Canal Commissioners caused the necessary surveys to be made, and complete manuscript maps and field notes of the Erie canal to be compiled, which were submitted by them to, and approved by the Canal Board, signed by the Canal Commissioners, and filed in the Comptroller's office on the sixth day of September, 1834.

The seventh section of the above article, is in the following words: "A transcript from the original map, or from a copy thereof, certified as correct by the officer with whom such map or copy shall be filed, shall be received as presumptive evidence, in all judicial and legal proceedings."

The blue lines delineated on the maps, are intended to represent the original lines, bounding the land appropriated for the construction of the canal; the space contained between them, shows the limits of the survey, and represents the land belonging to the State.

The map and explanatory notes accompanying this report, have been furnished by the chief engineer in the employ of the State, residing at Rochester. They will fully explain and show the present canal, the blue line, and the lines for the enlargement and improvement of the canal, from the east side of the Genesee river, through the west part of the city. The surveys for the enlargement of the canal, have not been made through the east part of the city.

The amount of damages awarded by the appraisers at Rochester since the location of the enlargement, is \$53,574.75.

The general mode and manner of appraising damages for property taken for the use of the canals, is directed by several acts of the Legislature. The 1st and 2d sections of chapter 368 of 1829, are in these words:

§ 1. It shall be the duty of the canal appraisers personally to view the premises on which damages shall be claimed, and to meet at such times and places as they may deem necessary, and as nearly in the vicinity of the premises as conveniently may be, and hear such proper and relevant evidence as shall be offered, and direct the attendance of witnesses in behalf the State, if in their opinion the interest of the State shall require it; and they are for that purpose empowered to administer oaths to witnesses, and wilful false swearing before the said appraisers is hereby declared perjury.

§ 2. It shall be their duty to enter in a book to be kept for that purpose, the nature and extent of all claims on which they shall pass, the items on which allowances are made, and the several amounts allowed, and the items on which no allowance is made; and they shall enter at length the testimony taken, and the grounds and reasons for their decision.

The 6th and 7th sections of chapter 287 of 1836, are in the following words:

§ 6. It shall be the duty of the appraisers to decide upon claims for damages, from the information obtained by them in viewing the premises, and from the evidence, if any, received by them from witnesses.

§ 7. It shall be their duty to deposite the books and papers in relation to the appraisal of damages, when not required to be used by them in the discharge of their duties as appraisers, in the Comptroller's office, for safe keeping.

It is believed that the appraisers in appraising damages at Rochester and elsewhere, have proceeded in the mode and manner directed by the statutes on that subject.

The Commissioners understand that in all cases where claims are made before the appraisers for land appropriated to the use of the public for the construction of a canal, where any part of the claim is included within the blue lines, the appraisers receive a certified copy of the maps in the Comptroller's office as presumptive evidence of title in the State; but they always allow the claimant in such cases to rebut the presumption by proof.

The books in which the decisions of the appraisers are entered, with the testimony taken by them, and the reasons for their decisions, are kept by them, or deposited in the Comptroller's office.

JOHN BOWMAN,
WM. C. BOUCK,
JONAS EARLL, JUN.
WILLIAM BAKER.

Albany, March 8, 1839.

REPORT

Of Nathan S. Roberts, Chief Engineer.

Rochester, 26th February, 1839.

SIR—

In presenting this map, it may be proper to explain the lines, figures, and notes, drawn and written upon it, in compliance with your request.

1st. The red line, which is on the margin of the present towing-path next the water, and is the base line from which all the other lines are set off at right angles.

2d. The blue lines, on each side of the red line, are set off from the red line, and the distances are marked in links, and the blue lines are considered as the boundaries of the original canal.

3d. The brown lines are set off in feet, from each angle, or from the red line, to boundary stone, which boundary stones show the distance from the red line as laid off for the enlarged canal.

Boundary stones are placed in the brown line at all the angles in said line, and their distances from the red line are written on the map at all the said angles, from the Lyell road to the brick building, owned by Messrs. Child & Talman, on the west side of Exchange-street. The enlarged canal, on the same distance on the north side, is designated by boundary stones, and by the brown line, and in part by the original blue line, as it is laid down on the map, from near Buffalo-street to Exchange-street. From Exchange-street east to the Genesee river, the brown line on the south side runs near the foot of the foundation wall of the wing of the bridge abutment on Exchange-street, and thence along the foot of said wall to the south corner of said wall above the south end of the west abutment of the new aqueduct; and from thence up the west margin of the Genesee river in a direction to the east face of the west abutment of Court-street bridge, so far as to form a line parallel to, and 200 feet above the upper ends of the new piers of said aqueduct; and thence to run parallel thereto 361 feet across said river, and thence down the river to the southwest corner of the east abutment of said new aqueduct.

From thence the shaded line shows the margin of the east abutment and of the north and south wings connected therewith, and is also shaded along the outside (west side) of the present canal wall, thus including what is at this time constructed or built up to the bottom of the water-table, defining the outlines; and the brown line shows the length to

each angle, as marked in feet, and written in the corner of the map, as the survey was made, and presented to the appraisers. But after the buildings of Mr. H. Ely were removed, it was considered to be best to make an alteration in the curve of the south wing, by a larger radius, and by moving more to the west the south end of the new mill-race arches, by which they were shortened about 25 feet in their length, and gave them a better direction for receiving the stream, and this made it necessary in order to cross their axis at right angles with the north wing, to move said wing 10 feet further south from H. Ely's mill at the blue line, than is designated in the said survey; and by moving the south end of said arches 12 feet to the west, it shortens them as above stated, and leaves out land appraised next Mr. Ely's mill, and at the south end, and takes in land not appraised on the west side, as may be seen on the map by tracing the direction of the brown line, and of the shaded line, along the margin of the masonry.

The appraisement of ground for the foundation of the east abutment and wings extends to the south end of the upper wing, as the same is included within the brown lines. All other appraisements made in Rochester for the canal enlargement, are situated between the place or point last mentioned above, and the east line of Exchange-street.

It may be proper at this time to state, that the space within the blue lines on each side of the red line, has hitherto been considered as the space or width necessarily occupied by the original canal, and the outside slopes of its banks.

Acting upon this principle, all my locations for the enlarged canal have been made, considering in all cases the ground, or space, within the blue lines of the original survey, as laid down on the State maps, as being originally appropriated to the necessary purposes of making and maintaining the present canal; only the ground taken outside of those blue lines has been considered as new appropriations for the purposes of the enlarged canal, and only these additions have been presented as subject to present appraisements.

Submitted with due respect.

NATHAN S. ROBERTS, *Chief Engineer,*
Rochester division enlargement of the Erie Canal.

JOHN BOWMAN, Esq. *acting Canal Commissioner.*

No. 288.

IN ASSEMBLY,

March 9, 1839.

REPORT

Of the select committee, on the petition of inhabitants of Minisink.

Mr. Denniston, from the select committee, consisting of the delegation from the county of Orange, to whom was referred the petition of citizens of the town of Minisink, in said county, praying for the passage of a law extending the time for the collection of taxes in said town,

REPORTS:

That the collector of the said town of Minisink, by reason of sickness, has not been able to collect the taxes of said town, within the time specified in his warrant of collection, and that by reason of the expiration of said time thus specified, many citizens refuse to pay their taxes.

The committee therefore beg leave to report a bill for extending the time for collecting taxes in the said town of Minisink.

IN ASSEMBLY,

March 6, 1839.

REPORT

Of the select committee on the petition of John Hyney, and others.

Mr. Bliss, from the select committee to whom was referred the petition of John Hyney, and five hundred and fifty others, citizens of the town of Carlisle and its vicinity; also the remonstrance of William Coss and sundry other citizens,

REPORTS:

That the petitioners represent that they are citizens of the town of Carlisle in the county of Schoharie and its vicinity, and that they reside in a section of country, where there are no permanent streams of water sufficient to supply grist mills during the dry seasons of the year nearer than the Schoharie creek, a distance of about fourteen miles. That the only grist mills in the vicinity of the petitioners in the town of Carlisle, is one belonging to John Hyney, one of the petitioners above named. Said mill is situate on a small stream known as Flat Brook, and its location is such as to render it convenient for a population of about five thousand inhabitants.

They further represent, that in their opinion, if said Hyney had the privilege of raising his dam across said creek near where said mill is situate, two feet higher than it now is, or has been for the last twenty-seven years, a quantity of water would be raised sufficient to keep said mill in operation, except in very extraordinary droughts. But in so doing he would probably overflow from twenty to forty acres of lands belonging to other citizens, represented by the petitioners to be of small value except for the timber.

And they further state, that the said Hyney, as they believe, and as is testified to by several respectable citizens, has made all reasonable overtures to the owners of said lands, offering them much more than said lands are worth, or any damage said owners would sustain in consequence of the raising said dam or the overflowing said lands, but that all such overtures have hitherto been unavailing.

They further represent, that the inhabitants in the vicinity of said mill feel deeply interested in having the condition of said mill improved as proposed, in order that their grinding may be done at said mill during the year, believing that it would be of great public benefit and convenience.

They further represent, that said Hyney is abundantly able, and as they believe willing to pay a reasonable compensation for all lands he may overflow or injure; and they pray the passage of a law authorizing the raising of said dam.

Your committee after having carefully investigated the subject, have come to the unanimous conclusion favorable to the prayer of the petitioners, and ask leave to introduce a bill.

IN ASSEMBLY,
March 12, 1839.

REPORT

Of the committee on claims, on the report of Wm.
Brayton and others.

Mr. A. Smith, from the committee on claims, to which was referred the petition of Wm. Brayton and others, praying for a re-appraisement of damages, because the State no longer keeps in repair the canal fences, and the report of the Canal Commissioners thereon,

REPORTS:

The committee learn from the report of Messrs. Selden & Wood, appraisers, Assembly Journal, 1829, page 489, "That in estimating the damages in the cases of the petitioners, the appraisers did not take into that estimate the expense of making and keeping in repair the fences necessary to be maintained along the margin of the canal, and the reason was that we supposed those fences would be kept up and maintained by the State, and that probably some arrangement might ultimately be made with the petitioners in relation to those fences, by which the State would commute, and which might be equally beneficial to the petitioners, and advantageous to the State." In answer to an inquiry from the chairman of the committee, the Hon. S. Young says, "That when the appraisements were made, I think the State did keep them in repair; and it is my impression that it was then understood that the State would continue to keep them in repair, and that the damages were appraised accordingly."

The committee, if left to decide the question, whether the State ought even to have built or maintained fences along the canals, would proba-
[Assem. No. 290.]

bly be of the opinion that the State ought never to have built or repaired any canal fences, but that the damages ought to have been always appraised to the owners of lands along the canals, as it is when roads are laid, leaving it to the owners of the lands always to make and repair the fences. As the damages in the case of the petitioners seem to have been appraised with the understanding that the State had built the fences, and would keep them in repair, the committee come to a conclusion very different from that which the Canal Commissioners seem to have arrived where they say, "The circumstances of these appraisements being made under an expectation that the State would continue to maintain the fences, is by no means conclusive that the owner of the land is entitled to damages on account of the omission of the State to do so. The benefit of the canal may be far greater than all his damages, including the maintenance of fences. During the long time that has elapsed since the State declined to repair the fences, the ownership of many of the farms along the canal has been changed. The present owners in such cases must have come into possession with a knowledge that the State did not make these repairs, and this must have had its influence on the consideration paid. Equity would hardly require of the State an indemnity against a burden which the owner had taken upon himself under such circumstances."

The committee are of the opinion, that as the damages were appraised under the expectation and belief of the appraisers, that the State would keep the fences in repair, the damages were appraised at less sums than they would have been, if the damages had been appraised under the contrary expectation, which is now a reality, viz: that the petitioners have to repair their own fences; and being of this opinion, although they do not propose that the State should keep the fences in repair, they are clearly of the opinion that the damages ought to be re-appraised.

The committee cannot tolerate the suggestion, that where a representation is made to the appraisers, that the State would keep the fences in repair, which would necessarily lessen the petitioners damages, and this admitted and acted on by the appraisers, and the damages thereby lessened, that immediately thereafter, when the contrary practice is adopted, and the petitioners compelled to repair their own fences, there shall be no re-appraisal; or, in other words, that there shall be nothing allowed the petitioners for keeping their fences in repair.

The committee also refer to a suggestion of the said appraisers, Messrs. Selden & Wood, Assem. Journal, 1829, page 489, that "the advantages which had been anticipated by the Champlain canal, had not been and probably never would be realized."

The committee have had under consideration the situation of that portion of the petitioners which have purchased since the State ceased to repair the fences, and as it is alleged in their behalf that as the former owners conveyed as an appurtenance to their lands, the claim against the State to keep the fences in repair, and as this has always been understood among the owners of the lands, it is by no means certain that the present owners have purchased fairly the claim against the State to repair the fences in question.

In order to obviate any possible difficulty growing out of the conveyance of the land in question, and as to the proper ownership of the damages to be re-appraised, the committee, in the bill proposed to be introduced, have made the provision that the damages appraised under the same, shall be paid to those persons who were owners of the lands when the damages were at first appraised, unless it shall plainly appear that in the sale of the lands, the former owner has conveyed to the purchaser the claim against the State to keep the fences in repair, in which case it is to be paid to the purchaser, or the person who is entitled thereto by conveyance from such purchaser.

The committee have come to the conclusion that the petitioners are entitled to relief, and ask leave to introduce a bill accordingly.

IN ASSEMBLY,

March 12, 1839.

REPORT

Of the Superintendent of Common Schools, on the bill entitled, "An act providing that the trustees of school districts, lying in two or more towns may assess the taxable property therein."

The Superintendent of Common Schools, to whom was referred by the Hon. the Assembly, the bill entitled "An act providing that the trustees of school districts, lying in two or more towns may assess the taxable property therein,"

RESPECTFULLY REPORTS:

The petitions accompanying the above mentioned bill represent, that the valuations of real estate in different towns are very unequal, and that as a consequence, when a school district consists of portions of different towns, the taxes imposed in such district will be inequitably assessed. There is doubtless much truth in this representation. The evil, however, extends much farther than school district taxes; all county charges are assessed in a manner liable to the same objection. The remedy ought to be commensurate with the evil, and should be applied rather to the act for the assessment and collection of taxes than to the common school act. The inequality of valuations in different towns, has long been a subject of complaint, and the Legislature attempted to provide a remedy, by authorizing the boards of supervisors of the different counties to equalize them. A more safe and impartial tribunal could not well be selected; but if any other should be, its power should be extended over the whole subject matter.

As there are but three trustees in a school district, there is reason to apprehend that the two who would constitute a majority, would not be considered impartial in a question between the valuation of real estate in their own portion of the district, and that of the other portion, and a perpetual strife would be kept up between the portions of the districts, in the election of their trustees. A tribunal which would perhaps inspire more confidence, and avoid some of these evils, might be formed of the county judges. But the correction of any valuations ought to extend to assessments for all purposes. The subject belongs perhaps more strictly to the department of the Comptroller; and these suggestions are thrown out more with a view of showing the nature and difficulties of the question, than with the purpose of proposing a remedy, to which the Superintendent at present does not feel adequate.

All which is respectfully submitted.

JOHN C. SPENCER,

Superintendent of

Common Schools.

Albany, March 11, 1839.

STATE OF NEW-YORK.

No. 292.

IN ASSEMBLY,

March 11, 1839.

REPORT

Of the committee on claims, on the petition of Ogden Mallory.

Mr. Norton, from the committee on claims, to which was referred the petition of Ogden Mallory, for relief.

REPORTS:

That on the 10th of August, 1825, A. L. Beaumont and others contracted to construct locks No. 8, 9, 10 and 11, on the Oswego canal, and on the 19th of May, 1826, petitioner became the assignee of the contract, and as such assignee completed the work. The contract prices were for locks 8 and 9, \$700 per foot rise, and for 10 and 11, \$750 per foot rise.

Petitioner complains that he was obliged to excavate the lock-pits, prepare the foundation and embank the walls; alleging that he understood the contract to require of him only to execute the stone masonry and other parts of the locks, without either excavating the pits, laying foundations or embanking the walls; and insists that such is the true construction of the contract.

The committee entirely differ with the petitioner as to the right construction of the contract, and cannot entertain a doubt that it requires the performance of all the work of every description necessary in building locks.

Petitioner asserts that he has lost more than \$3,000 dollars, after deducting the sum of \$3,805.43 allowed him by the Canal Board for extra work.

Petitioner produced before the committee a copy of an estimate of the actual worth of these locks, made by Mr. Mills, by direction of Mr. Jerome, engineer on the line, in which the prices of the work are set down as follows: Nos. 8, at \$950, and No. 9, 10 and 11, at \$900 per foot rise.

The committee are fully satisfied that petitioner has sustained a heavy loss, as he asserts, but inasmuch as the case is in all respects one of unfavorableness of terms of the contract merely, they cannot, under the decisions of the Legislature, report a bill for his relief.

The committee, for a more full history of the case refer to the petition and the estimate thereto attached, to a statement of the allowance made by the Canal Board, the minutes of the testimony taken by the committee, and to a copy of the contract, all which will be found on the files of this session.

The committee offer the following resolution.

Resolved, That the prayer of the petitioner ought not to be granted.

TESTIMONY

Taken by the committee.

Mr. Mills, Engineer. Was assistant engineer on the Oswego Canal. The estimate (a copy of which is annexed to petition,) was made by self, by direction of Mr. Jerome, and is what witness supposed to be the actual worth of the work.

It is customary now to have prices per cubic yard for both stone masonry and excavation, but not so then on Oswego canal. The contract price in this case is low.

Petitioner talked of abandoning, and it was decided that the contract bound him to excavate the pits, &c. He said he should not be able to complete the work. It was desired that the work should be done, and encouragement was given to induce him to go on. He was told that, probably, if the Canal Board thought the excavation of pits, embankments, &c. extra, they would allow and pay him for it. Thinks the claim is similar to that of Allen & Hecox.

Hon. *Mr. Hurd* of the House. Has been a engineer several years; in other States mostly, sometimes in this. Had charge of Lockport locks, &c. a while. His practice has always been to pay excavation of pits, foundations, &c. separate.

Mr. Barrett, engineer. The locks next of Pittsford on Erie canal were let at so much per foot left, but the excavation was provided for separately. Thinks the estimate of work made by Mills low enough; and thinks the contract does not include excavation, &c.

No. 293.

IN ASSEMBLY,

March 8, 1839.

REPORT

Of the committee on grievances, on the petition of
Plynn Darby.

Mr. Wheeler, from the committee on grievances, to which was referred the petition of Plynn Darby, a citizen of Washington county, praying for an additional compensation for excavation on the Champlain canal,

REPORTS:

The petitioner states in his memorial, that in the year 1825, William Coleman, John Merriam, John Carr, Jacob Searl, and Obadiah Dinsmore, entered into contract with the Canal Commissioners, in the usual form, to excavate several sections on the Champlain canal; among which was section No. 11, a portion of which was slate rock; that the said Coleman & Co. were to receive forty-four cents per cubic yard for excavation; that this petitioner contracted with said Coleman, & Co. to excavate said section No. 11 for thirty cents per cubic yard; that in pursuance of said sub-contract, the petitioner did, in the years 1825 and 1826, execute and complete the same as directed by the engineer then being in charge of this portion of the State work, and to the satisfaction of said engineer as petitioner supposed; but after the petitioner had dismissed his workmen, the said engineer, (Mr. Clark) directed that a portion of said canal section, say about 25 rods, should be deepened—all through slate rock from 8 to 16 inches. That the petitioner in the first excavation of said slate rock, performed it by gun-powder blasting, and that by the premature discharge of a blast he was deprived entirely of the sight of his eyes, which deprivation still continues; that in con-

[Assem. No. 293.] 1

sequence of this calamity, he was unable to give any further personal attention to the said work, and that the said Wm. Coleman & Co. did perform the same, and deducted the amount of cost from the sum then due to petitioner for said excavation.

And the petitioner further represents, that when said excavation was completed, as he thought and verily believes, that the further and deeper excavation performed by said, Wm. Coleman & Co. was fully and entirely below the contracted bottom of the canal, and was necessarily performed at a great increase of expense, beyond what would have been necessary if it had been done with the other excavation; that the water made in, and the additional excavation had to be performed with pecks and bars, and cost one dollar per yard; and that the whole extra expense of extra excavation had to be paid by the petitioner. And he further states, that the first excavation cost him over fifty cents per cubic yard; that when the petitioner commenced the said work, he owned a house, stock of cattle, hogs and sheep, and was in comfortable circumstances; that to pay his laborers on said job he had to sell all his property, and the avails of all he realized in excavation of the section, and he, with his family left entirely destitute of property and house, and the most *grievous of all*, the petitioner doomed to grope without enjoying in time to come a single ray of light.

The petitioner further states, that he verily believes that in the first estimate of said work on that part of section No. 11, excavated by said petitioner, the said engineer estimated and allowed no more than to that point where the petitioner ceased and dismissed his workmen, being informed that the excavation was deep enough; and that all the slate rock excavation, subsequently made by order of said engineer, was made below the bottom of canal, and for which no allowance was made the petitioner.

And the petitioner shows, that the said Wm. Coleman & Co. have released to him all extra allowance for said services, if any they could or ought to receive. And the said petitioner solicits an extra allowance generally of all the excavation above the contract prices, such as it was fairly and equitably worth.

To all of the foregoing statements the petitioner makes oath before a supreme court commissioner, who certifies that the said "Plynn Darby is a man of good character and entitled to full credit."

The general statements of the petitioner are verified by the accompanying affidavits of William Coleman, Jacob Searl, John Merriam, John

A. Miller, George A. Liddle, Nicholas Rogers, Edward Gilligan and Alexander Ferguson, and that the extra excavation performed by the petitioner, and which was not allowed or reckoned, or mismeasured, would amount to eight or ten hundred dollars.

Your committee, on examination of the subject, find that the petitioner first presented his claim to this House in 1835; the subject was then referred to the Canal Commissioners, who reported, see Assembly Documents, No. 118, unfavorably to the prayer of the petitioner. The next that is found of this claim on record is in the session of 1837; the committee on claims reported unfavorably, see Assembly Documents, No. 214. In 1838, the same subject is referred to the Canal Board, as your committee think, rather unfavorably. See Assembly Documents, No. 193. It appears that no further action was had the last session.

Your committee would further state, that some additional papers have been received on this claim, but that they will not, in the opinion of your committee, essentially vary the result.

In conclusion, your committee unanimously consider this case as appealing strongly to the sympathies if not to the justice of this House; and as considerable public interest appears to be felt on this subject, your committee rest from any further action on this claim, willing to carry out any further direction the House may see proper to make.

IN ASSEMBLY,

March 8, 1839.

REPORT

Of the select committee on the petition of M. T. Reynolds, and other.

Mr. Davis, from the select committee, to which was referred the petition of Marcus T. Reynolds, Samuel Stevens, and others, of the city Albany, praying that the time for holding the mayor's court in said city may be changed,

REPORTS:

That the petitioners represent, that by law the mayor's court of the city of Albany commences its terms on the first Tuesday of each month during the year; that during eight months in each year the supreme court of this State holds a term for the hearing of motions, commencing on the same day; that the court of chancery also holds terms in said city, commencing on the same day; that in consequence of the high standing of the mayor's court many suits are commenced therein; and that in consequence of the said several courts being held on the same day, great inconvenience arises to members of the bar and suitors in said court. The petition is signed by nearly all of the members of the bar in said city, and the petitioners pray that the time of the commencement of the terms of the mayor's court may be changed from the first to the second Tuesday in each month.

The committee is satisfied that the convenience of the members of the bar, and of the citizens of Albany, will be greatly promoted by the change of the time of holding the terms of said court as prayed for by the petitioners, and they ask leave to introduce a bill in accordance with the prayer of the petition.

No. 295.

IN ASSEMBLY,
March 11, 1839.

REPORT

Of the committee on the petitions of aliens, on the
petition of George Blair.

Mr. Johnson, from the committee on the petitions of aliens, to whom was referred the petition of George Blair, an alien, praying the Legislature to pass a law to secure certain persons to whom he has sold and conveyed real estate,

REPORTS:

That it appears from the facts set forth in the petition, that the petitioner had made a declaration of his intention to become a citizen of the United States three years previous to his buying or selling said real estate, and therefore the present existing laws afford ample security for each contracting party.

The committee, therefore, offer the following resolution:

Resolved, That the prayer of the petitioner ought not to be granted.

IN ASSEMBLY,

March 12, 1839.

REPORT

Of the committee on canals and internal improvements, on the petition of the inhabitants of Dansville.

Mr. Lewis, from the committee on canals and internal improvements, to which was referred the petition of numerous inhabitants of the village of Dansville and vicinity, for a branch canal or side cut from the Dansville branch of the Genesee Valley canal to said village, and also the remonstrance of other inhabitants of Dansville, against any alteration of the present termination of said branch canal,

REPORTS:

That the Dansville branch has been located at the distance of one half mile or more from said village of Dansville.

The petitioners state, that Dansville is one of the oldest settlements west of the Seneca lake, and that a great portion of the inhabitants of Dansville have resided there for many years, and that it is a place of considerable business.

To accommodate the business of this village, seems to have been one of the leading objects of the act authorizing the construction of the Dansville branch of the Genesee Valley canal, and not the bringing into existence of a rival village at a point so near as to destroy it.

The petitioners do not now ask that the present location be changed, however injudicious may have been its selection in the first instance, but that a side cut be constructed, commencing immediately above the up-

per lock in the Dansville branch, extending to the village of Dansville near the house of Conrad Welch.

The petitioners allege, that in consequence of the location of the Dansville branch so near the village, and yet so as to fall short of it, the value of the property of the village has been actually diminished by the erection of ware-houses and other fixtures, to accommodate the navigation of the branch at a point too remote for the transaction of business at said village, and yet so near as essentially to divert from it the business which would legitimately belong to it were there no canal in that section of the country; thus in a great measure destroying the fair prospects of this otherwise flourishing village, for the purpose of enhancing the fortunes of a few individuals.

The engineer who surveyed the route for this proposed side cut, makes the following estimate of its cost, viz:

Twelve thousand three hundred and fifty-seven cubic yards of excavation, at ten cents per yard, amounting to,	\$1,235 70
One thousand three hundred and sixty-two cubic yards of embankment, at ten cents per yard, amounting to,	136 20
One thousand two hundred cubic yards of lining, at thirty-one cents per yard, amounting to,	372 00
Total amount,	<u>\$1,473 90</u>

The engineer further states, that if the said branch canal or side cut shall be extended seven and a half chains beyond a certain willow tree, standing near the dwelling-house of the said Conrad Welch, it will require the following additional expenditure, viz:

The road bridge,	\$800 00
Twelve thousand eight hundred and seventy-three cubic yards of excavation, at fifteen cents per yard,	1,930 95
Three hundred and twenty-one cubic yards of lining, at thirty-one cents per yard,	99 51
Making the total sum, including the above estimate, of ..	<u>\$4,304 36</u>

The above estimate is based upon the plan of a canal of the following dimensions, viz: The width at the bottom to be twenty-six feet, and at the top thirty-nine feet.

Taking into view all the circumstances of this application, the committee have come to the unanimous conclusion, that the prayer of the petitioners ought to be granted, and ask leave to introduce a bill accordingly.

IN ASSEMBLY,

March 11, 1839.

REPORT

Of the committee on grievances, on the petition of
Asa and Hiram Eddy.

Mr. Wheeler, from the committee on grievances, to which was referred the petition of Asa Eddy and Hiram Eddy, praying compensation for damages done their boat and cargo on the Erie canal in 1836,

REPORTS:

That the petitioners set forth that they were partners in business under the firm of A. & H. Eddy, and during the year 1836, owned and employed a number of boats on the Champlain and Erie canals; that of this number one boat was called the *Starr*; engaged and employed a crew for said boat as follows: Elliot Burdett as master, George C. Burdett and Franklin Havens, boatmen, with a cook and driver. That about the 13th September, 1836, the petitioners directed said master, with the canal boat *Starr*, to proceed to Syracuse, load with salt and navigate the same to Whitehall, Washington Co. That the said boat was taken to Syracuse, received her freight, 1,200 bushels coarse salt, and $38\frac{1}{2}\frac{2}{8}\frac{0}{0}$ barrels fine salt, for the petitioners. After taking clearance and paying forty-seven dollars and some cents for tolls on said boat and cargo, said boat proceeded on towards her port of destination; that when within a few rods of the lower aqueduct, and within about four miles of the junction of the Erie and Champlain canals, the said boat struck her bottom on a stone lying in the middle of the canal, and immediately sunk; that said stone was out of sight, and covered in about two and an half feet of water; the stone was not seen; was judged to be a large stone, as it broke in four plank on her bottom. The petitioners state that they entirely lost 692 bushels of coarse salt, and the remainder

thereof was received by another boat, damaged more than one-half its value. The petitioners sum up their whole damages on *cargo, boat, and detention*, at \$533.86.

The accompanying affidavits of the master and boatmen of the said canal boat, substantially and clearly prove the matter set forth by the petitioners in their memorial, and that the boat was in good condition, properly and skilfully managed after the accident, to prevent further loss of property than was indispensable under such circumstances.

Your committee are of opinion from the evidence adduced, that the petitioners have not made out that the State agents or any of its officers having charge on this section of canal, knew that there was any obstruction or danger in navigating this canal; nor does it appear sufficiently clear how the stone came there, whether by accident or intention; and that in order justly to charge the State with the damages which may be sustained in navigating the canal, it would seem to your committee that neglect, want of prudence, or common sagacity, should be made out against the State officers or its agents.

In conclusion, the committee recommend the following resolution:

Resolved, That the prayer of the petitioners ought not to be granted.

No. 298.

IN ASSEMBLY,

March 11, 1839.

REPORT

Of the committee on claims, on the petition of Calvin Baldwin.

Mr. Salisbury, from the committee on claims, to whom was referred the petition of Calvin Baldwin,

REPORTS:

The petitioner represents, that in 1816, a bridge was built across the Hudson river, in the county of Warren, by the State; that the said bridge was built under the superintendence of Duncan Cameron, one of the commissioners appointed for that purpose; that he entered into a contract with said commissioner to furnish the timber, boards, plank and shingles for said bridge; that he did furnish the same, and in so doing he suffered great loss. The petitioner represents that the circumstances which occasioned such loss were as follows: That at the time he entered into the contract, he made a calculation to have sawed most of the timber at a saw mill owned by the petitioner; that in consequence of the dryness of the season the water failed and he could not saw the timber; that he was obliged to hew it at a great expense; that he had to go six miles through woods and swamps to procure some of the long sticks of timber, which was much more expensive than he anticipated. And he further states, that provisions were uncommonly high that season, about double to what they were the year before.

It appears by the affidavit of Archibald Washburn and Samuel Barber, and the certificates of two or three individuals, that the petitioner entered into the contract above alluded to, and fulfilled the same at a great loss. The petitioner does not state, neither did it appear be-

[Assem. No. 298.]

fore the committee, what he was to have per foot for the timber, boards and plank, or how much per thousand for shingles.

Your committee are unanimously of the opinion that should the State allow this claim, which is now for the first time presented, and which is of more than twenty years standing, simply because the petitioner had a hard bargain in consequence of the dryness of the season, the failure of water, the high price of provisions, &c. it would open a door for any and every man that ever built a bridge, or excavated a yard of earth for the State, and had not made money by it, to urge with equal force his claims upon the State; and if the policy of allowing such claims should prevail, it would, in the opinion of the committee, induce individuals—irresponsible individuals—to take State work at any price, no matter what. If they made money, well; if not, they would have nothing to do but just knock at the door of your treasury, and receive whatever they could make appear by the testimony of personal friends, they had lost in the transaction. Your committee are also of the opinion, that should the State allow such claims it would have a tendency to induce contractors for State work to be less vigilant, economical, prudent, persevering and active, than they would be, were they given to understand that they would be held strictly to their contracts.

In view of all the facts of the case, the committee beg leave to offer for the consideration of the House the following resolution:

Resolved, That the prayer of the petitioner ought not to be granted.

No. 299.

IN ASSEMBLY,

March 12, 1839.

REPORT

Of the committee on the internal affairs of towns and counties, on the petition of inhabitants of Genesee county.

Mr. Hubbard, from the committee on the internal affairs of towns and counties, to whom was referred numerous petitions of the inhabitants of the county of Genesee, praying for the passage of a law reviving the distinction between town and county poor in said county,

REPORTS:

That the committee have examined the subject referred to them with care and attention, as much with the view of promoting the comfort and happiness of the unfortunate class of citizens to which the petitions refer, as to the interest of those whose duty it is to support them.

By referring to the returns of the superintendents of the poor of the county of Genesee, in answer to certain interrogatories sent them by the committee on the internal affairs of towns and counties of this house at its last session, it will be seen "that the average number of poor in the poor-house in said county during the preceding year, was 167, the greatest number having been 174, and the least number 149; the buildings for the accommodation of the keeper's family and hired help, and all the paupers, was a brick building, 44 feet by 34, with an unfinished garret used as a lodging room, one old wooden building 40 feet by 26, one and a half stories high, and one other wooden building 32 feet by 26, one story high."

It will be obvious to every one that the above described buildings are not of sufficient size to accommodate the number of paupers stated in the return of the superintendents, or of one half that number, and although the number has been reduced about 30 or 40 since the year 1837, yet unless the distinction between town and county poor is revived, the inhabitants of said county will necessarily be compelled to be at great expense in erecting new and more commodious buildings, which it is believed will be unnecessary if the distinction is revived.

There are evils attending the present system which new and enlarged buildings will not entirely remedy. The county of Genesee has at this time an increasing population of more than 60,000 inhabitants, and will therefore, according to the ordinary course of things, always have a great number of paupers, more, perhaps less, than 100, and oftener more than 200, which is altogether too many to have good care taken of them at any one location. That system cannot be very wise or humane, which (though it may save a few cents, or even dollars,) collects together a great multitude of individuals of all ages and of every variety of character, thereby exposing them to disease and death, and inducing the commission of crime by the facility with which it may be committed. If your committee have a just understanding of the object of the petitioners, it is not so much to lessen the expense of maintenance as to increase the comfort and happiness of the poor. There are many aged and feeble persons who would be supported as cheap, and much better, in the towns to which they belong, than at the county poor-house. The friends of such persons, who are not required by law to support them, if they are in their immediate vicinity, will feel obligated and even gratified, to administer to their wants, when if they are removed to the county poor-house they will consider themselves loosed from all such obligations.

There are some features in the present poor-house system which are not consonant with the pure principles of benevolence; as if rational beings had no other or higher enjoyment than "to live" honest; individuals, whose only crimes are, that the frowns of fortune, which no human wisdom can avert, has reduced them to penury and want, are taken from the quiet and cherished scenes of a long life, from friends and neighbors, and all those social comforts which render life tolerable, and transported to a place, which to them is little better than a prison, to be the companions of common vagrants, and of those whose indigence, in many instances, is the appropriate reward of indolence or crime.

If the wishes of the people of the county of Genesee are to be consulted upon this subject, there can be no doubt with regard to the proper course to be pursued; judging from the petitions, as well as from other sources, there is an unanimity in that county seldom witnessed. There are petitions, now before your committee, asking the repeal or alteration of the laws in question, signed by about 1,600 citizens of said county, together with the memorial of the board of supervisors, and not a single remonstrance against it.

Your committee believe that the Legislature should, to a very great extent, entrust the management of the local affairs of counties to the people, or to their authorized agents. Power vested in the board of supervisors is not very liable to be abused, and the numerous difficulties which occur in the management of the internal concerns of counties might be settled at less expense and more satisfactorily by said board than by the Legislature.

By an act passed at the session of 1837, (see sec. 27 and 28 of the 1st title of chap. 20 of the first part of the Revised Statutes,) the distinction between town and county poor was abolished in the counties of Warren, Washington, Saratoga and Genesee, and it was left in the discretion of the boards of supervisors of other counties at any time thereafter to abolish the distinction between town and county poor, and there is certainly as much, and more propriety, in granting said boards the power to revive such distinctions, than there was in giving them power to abolish it. That which was then an untried experiment, has since been fairly tested; and if contrary to what was supposed at the time the measure was adopted, it has been injurious rather than beneficial in its consequences. Your committee are of the opinion that the board of supervisors should have power to make the change as proposed by the petitioners, and for that purpose would respectfully ask leave to bring in a bill.

IN ASSEMBLY,

March 13, 1839.

REPORT

Of the committee on roads and bridges, on the petition of inhabitants of Deerfield and Utica.

Mr. Dunham, from the committee on the establishment and improvement of roads and bridges and the incorporation of turnpike companies, to whom were referred several petitions of the inhabitants of Deerfield and Utica, in the county of Oneida, praying for the passage of a law authorizing the construction of a Macadamized road from Utica to Deerfield corners,

REPORTS:

That the petitioners propose to defray the expense of making a Macadamized road from Utica to Deerfield, a distance of little more than one mile, by erecting on the road which is one of the principal avenues leading into the city of Utica, a gate, and collecting a light toll, to be expended solely in making and repairing the road. For this purpose they ask that a law may be passed appointing commissioners, with power to erect and maintain a toll gate, and to superintend and direct the making the road in the manner proposed; the gate to be kept up and the toll to be collected until the whole expense of constructing the road is fully paid, and then the road to be thrown open to the free use of the public, and to be kept in repair by the town in the same manner as other highways. The petitioners represent, that the section of road proposed to be improved in the manner mentioned, is situated on the interval land of the Mohawk river, and is so expensive that it cannot be kept in repair by the ordinary highway labor assessed on the inhabi-

tants of the town: the road requiring to be elevated considerably above the natural surface, to raise it above the highwater of the Mohawk river.

The toll proposed to be charged and collected is three cents on every vehicle drawn with two horses, and two cents on every vehicle drawn with one horse. It is believed by the petitioners that this light toll will yield a sufficient income to defray the expense, in two or three years, of Macadamizing the road from Utica to Deerfield corners, in the most approved and permanent manner, and that the public interest will be greatly promoted by such an improvement.

This mode of defraying the expense of constructing Macadamized roads is certainly novel in this State, but the plan is represented to have been attended with complete success in places where the experiment has been tried. It is freed from the objections which might be urged with great force against granting acts of incorporation, to continue for a series of years, with power to erect a toll gate on any of the principal avenues leading into large towns. On the plan proposed, all the money drawn from the public is to be expended for the public benefit. The plan is certainly entitled to the merit of being freed from the odium which attaches to exclusive grants of public franchises for individual benefit. In theory it is democratic, and must be so in practice.

It is also stated to your committee, that there is another road running parallel with the one proposed to be improved, and within a distance of about 40 rods of it, leading into the city of Utica, and which the traveller, who wishes to avoid the toll proposed to be collected, can travel, if interest or inclination dictates that to be the better or cheaper road.

Under a view of all the facts stated to your committee, they see no valid objection to the plan proposed, but on the other hand, if adopted, your committee are inclined to believe that it may be the means of extending hereafter by the influence of example, the advantages of good roads to other sections of the State.

Your committee therefore ask leave to introduce a bill.

No. 301.

IN ASSEMBLY,

March 12, 1839.

REPORT

Of the select committee, on the petition from Hudson and Poughkeepsie, for the prevention of fires from steam-boats.

Mr. Hogeboom, from the committee to whom was referred the petitions from the city of Hudson and village of Poughkeepsie, praying for the passage of some act for the prevention of fires from steam-boats,

REPORTS:

The petitioners represent, that Hudson and Poughkeepsie, have been much exposed to the ravages of fire from steam-boats navigating the Hudson river; that the price of insurance is thereby materially enhanced, and insurance with difficulty effected at all; that the city of Hudson has been several times fired from sparks or coals from steam-boats, and that during the last summer, that place sustained very heavy losses from an extensive conflagration which was thus communicated, and which, as the petitioners allege, might have been prevented by ordinary care.

The committee have personal knowledge of some of the facts stated in these petitions, and see no reason to doubt the truth of any of the allegations contained therein; and they are of opinion that the evils complained of imperatively require a remedy. It is somewhat remarkable that the subject has not before this time been brought to the notice of the Legislature. The destruction, however, of a considerable and very valuable portion of the city of Hudson, and the entire loss of many thousand dollars worth of property, occasioned by the cause above men-

tioned, seem to have aroused attention to this subject in a manner which, it is hoped, will result in the application of some substantial relief.

The petitioners propose a very simple and apparently efficient remedy, viz: to require the dampers in the chimneys or smoke-pipes of said boats to be closed while at or opposite to the places above mentioned; and they allege that the speed of the boats will not be thereby impaired, to any material, and certainly not to any objectionable extent. The committee have made some inquiries, whether the navigation of the river will be retarded in consequence of such a provision, and are informed that it will not be seriously, if at all affected. Under such circumstances, the committee, in the bill which they propose to introduce, have provided that this shall be done, or the escape of sparks and coals in some other way prevented.

To secure the proper observance of such a law is a matter of more difficulty. The agents and firemen on board of steam-boats are frequently irresponsible and transient persons, and difficult to be reached by the process of our courts and magistrates. The committee have made it the duty of the captains and engineers, as well as the firemen, to perform or enforce the performance of the service required by the act, and for neglect of this duty have imposed the penalty of fine or imprisonment, or both; and have thus endeavored to secure vigilance and attention on the part of every individual connected with the management of steam-boats.

This provision, however, is made greater to cover the whole extent of the evil. There seems to be no just reason why the sufferers should not be entitled to pecuniary compensation for the loss they have sustained, from the negligence or the malice of others. The committee have deemed it proper, therefore, expressly to provide, that not only the individuals who are directly instrumental in occasioning this loss, but also the owners of the steam-boats who have such individuals in their employ, should be responsible to the parties aggrieved for damages thus sustained. In no other way can the sufferers be indemnified; and probably in no other way can the necessary vigilance and caution in the navigation of these steamboats be secured. The committee also believe, that such a provision would have a very auspicious influence, not only in affording the specific relief appropriate to the evils complained of in these petitions, but in inducing greater caution and prudence in the owners of steam-boats in the employment of their officers, agents

and servants, and thus adding to the safety and protection of those travellers who use this means of conveyance for themselves and their property.

For the purpose of carrying out these provisions, the committee have prepared a bill, which they now ask leave to introduce.

No. 302.

IN ASSEMBLY,

March 14, 1839.

REPORT

Of the committee on the judiciary, on a resolution of the House on the subject of amending so much of the Revised Statutes, as relates to attachments against absconding, concealed and non-resident debtors.

Mr. McElrath, from the committee on the judiciary, to which was referred the following resolution of the House,

“Resolved, That the committee on the judiciary, be instructed to examine into and report upon the propriety of so amending the statute in relation to attachments against absconding, concealed and non-resident debtors, part 2, chapter 5, title 1, article 1, Revised Statutes, as to extend the same remedy by attachment to creditors not being residents of this State upon contracts made elsewhere, as is now granted to such creditors upon contracts made within this State.”

REPORTS:

That your committee have examined the law relating to the subject matter of said resolution, and find that a non-resident creditor is not entitled to the remedy by attachment unless the indebtedness arose upon a contract made within this State. This excludes all creditors residing in other States of the Union or in foreign countries, and thus a complete protection is afforded to the property of the non-resident, situate within this State, against the pursuit of his creditors who reside out of the State, unless it can be made to appear that the contract was made within this State. And as a creditor at large cannot claim the aid of a court

of chancery, nor commence a suit at common law against an absent defendant, he must as a matter of course, if denied the process of attachment, be without remedy.

This provision in the statute appears not to have been introduced for the purpose of favoring our own citizens; because an attachment once levied, all creditors no matter where residing are permitted to come in, and shall stand on an equal footing in the distribution of the debtor's estate; and a foreign creditor, though he may not attach the property of a non-resident debtor, is entitled to an attachment against the estate of a resident of this State absconding or lying concealed, who may be indebted to him.

The history of the attachment law in this State shows, that a limitation of the remedy in the case of non-resident creditors has not always obtained in our legislation. It was a relic of colonial times, abandoned in the early part of the present century, and reinstated in the law by the late revisers of our statutes. The reasons which recommended it to the favor of a colonial Legislature were narrow, and peculiar to the times; the object seems to have been to throw impediments in the way of English creditors. The motives which led to its abandonment, when these reasons no longer operated, were a large and liberal policy, a fair view of reciprocal rights, and a proper understanding of the interests of commerce. The attachment process, says Chancellor Kent, was a favorite measure with the colonial Legislature; but in respect to non-resident debtors it was strongly opposed by the Governor and council in some of the States, and royal instructions were sent to refuse assent to such attachment laws. The great objection on the part of the executive power, being, that they did not place the English and American creditor on an equal footing. The objections made in England to the passage of particular laws in this country, were not in these times of much avail, and in this State the opposition to the attachment law was without effect. This being the spirit whence the attachment law sprung, it is by no means strange that the feature we are now considering should have been subsequently engrafted on it.

In the year 1801, the Legislature viewing the subject in a different aspect, remodelled the attachment law, and in the act passed 21st March in that year, the following provision was introduced as the 20th section of said act: "Any creditor residing out of this State, shall be deemed a creditor within this act, and his attorney on producing a letter of attorney duly authenticated, and legal proof of his demand, may proceed

and act in the same manner under this act, as if the creditor himself was present." This section however was deemed by some to conflict with another section of the same act, and it became the subject of various and conflicting decisions in the courts. In the case of *Fitzgerald* (2 Caines, 318,) the twenty-third section was held by the court to confine the remedy to the estates of debtors residing out of the State, and who *are indebted within it*, and that this was to be understood as restraining the phraseology of the twentieth section. See also, *Robbins vs. Cooper*, 6 John. Ch. R. 180; *Caldwell's Case*, 5 Cowen, 293; and *Schroeders Case*, 6 Cowen, 603.

The last time this statute came under the notice of the supreme court prior to the Revised Statutes, was in *Schroeders* case. The revisers in their report to the Legislature, state that they took this case as deciding the law on the subject, and that without introducing any change they have merely attempted to incorporate its principles into the statutes. The clause in the Revised Statutes is therefore merely a declaratory enactment. In the case just alluded to, the court imply that the circumstance of the *contract* having been made *within this State*, is one that would bring a case within the meaning of the phrase *indebted within the State*. But the court do not say, that this forms the only class of cases falling within these terms. The present law makes the expression of the court *exclusive*. It certainly does not appear to have been so used by the court, nor does it appear from any thing that is said that they wished so to be understood.

From a careful view of the whole subject, your committee have come to the conclusion that the restrictive principle contained in the present law, crept into the statute through inadvertency, or, perhaps a misapprehension of the then existing law; that its principle has never been recognized by the courts, nor directly and intentionally sanctioned by the Legislature; that it is in itself an unjust and injurious principle; and, finally, that the extension of the same remedy to non-resident creditors will not in any possible way affect the present position or advantages of resident creditors.

The committee, therefore, in conformity with the resolution, ask leave to introduce a bill.

No. 303.

IN ASSEMBLY,

March 15, 1839.

REPORT

Of the select committee, on the petition of the widow and heirs of Eliphalet Ackley.

Mr. T. B. Cooke, from the select committee to which was referred the petition of the widow and heirs of Eliphalet Ackley, deceased,

REPORTS:

It appears that the deceased was the owner of the west half of lots No. 42 and 48, of 200 acres each, in Rapelyea's patent in the county of Delaware: that on the 21st day of March, 1826, he paid the taxes thereon for the years 1817, to 1821, both inclusive; amount \$16.73. The receipt of the Treasurer was not countersigned by the Comptroller, nor was the same entered on his books. It is presumed the deceased, who was not accustomed to transacting business of this character, was not aware of the necessity of presenting the receipt to the Comptroller for his signature; therefore, a few days after said payment was made, viz: at the tax sale in April, 1826, the whole was sold for said taxes and expenses; amount \$33.55.

It also appears that on the 31st March, 1828; the deceased paid \$9.18, for the taxes of 1822 to 1826, both years inclusive, for which the Treasurer's receipt has been presented to your committee, which payment was made to the State near two years after the land had been sold for taxes as herein before stated; which sale was subsequent to the payment of the same taxes; and although this payment is found on the Comptroller's book, the receipt is not by him countersigned. It is hoped this may prove the only case of this character which has occurred, for it is deemed one of peculiar hardship. This widow and these

heirs have not only lost 200 acres of land, but have paid, and that before the sale, the very taxes for which it was sold; and also two years thereafter, the taxes of five subsequent years; and although there has been negligence on the part of the deceased, it is not believed the State has discharged its duty. Your committee are of opinion, that whoever pays money into the treasury, is entitled to receive back a legal voucher, and if the law requires the signature of the Comptroller, that signature should in all cases be affixed before the voucher is delivered. It is the duty of the Legislature to protect our citizens, and not to leave them to become the prey of speculators. It is not, by your committee, deemed sufficient to hand out to those paying money a receipt therefor signed only by the Treasurer, while our laws require the signature of the Comptroller also. Of the justice of the claim for \$16.73, and interest thereon, from March 21, 1826, there can be but one opinion; inasmuch as the State received the whole amount of the taxes, with all costs, from the proceeds of the land, for the payment of which there is found no authority; legislative action is therefore necessary. And as your committee deem this a case of peculiar hardship, growing out of a practice if not altogether improper, certainly endangering the interest of our citizens, therefore, your committee deem it a duty to ask permission to present for the consideration of the House, a bill to provide for the payment in part, of the loss sustained by the memorialists, which they justify on the ground, that the loss has been occasioned by the neglect of both parties; which bill requires that hereafter, before delivery, all receipts shall be countersigned by the Comptroller.

No. 304.

IN ASSEMBLY,

March 18, 1839.

ANSWER

Of the Chancellor to the resolution of the Assembly of the 9th March, 1839, relative to the petition of Harvey Sniffen and wife, and the subject of divorces dissolving the marriage contract.

TO THE LEGISLATURE OF THE STATE OF NEW-YORK.

In compliance with the request contained in the resolution of your honorable body, referring to the Chancellor the petition of Harvey Sniffen and Phebe his wife, praying for a divorce, and requesting his opinion whether, if the facts assumed in the petition are substantiated by legal proof, the power of the Court of Chancery is sufficient to grant the relief sought? and if not, whether in his opinion any law can be enacted investing that court with adequate powers to afford relief in this case, or in all cases of a like kind, without detriment to the public interests and public morals? and whether such a law is desirable at the present time? the undersigned respectfully

ANSWERS:

That by the existing laws of this State, the Court of Chancery is authorized to annul a marriage, or to dissolve the marriage contract in two cases only. In the one case, upon the ground that the original contract was illegal and improperly entered into; as in the case of impotency, mental alienation, extreme youth, the previous marriage of one or both of the parties, or where the consent of one of the parties to the contract was obtained by force or fraud. In cases of this description the court does not in strictness dissolve a marriage. It merely declares by a judicial sentence, that the supposed marriage was a nullity

from the beginning; and of course that both parties, whether innocent or guilty, are free from all the obligations thereof, except so far as the law has interfered for the protection of the unfortunate issue of the illegal and unauthorized intercourse between them. In the other case the court is authorized to dissolve a marriage contract which was originally valid, upon due proof that one of the parties has broken the contract in violation both of the moral and the divine law, by the commission of adultery, the complaining party being still innocent and undefiled.

It is very certain that the case which these petitioners probably intended to state to the Legislature does not come within that provision of the Revised Statutes which authorizes the court to dissolve the vinculum of a marriage, originally valid, on the ground of adultery; which provision was never intended to embrace the case of ante-nuptial incontinence. Indeed, it had long previously been settled in the ecclesiastical courts of England that ante-nuptial incontinence, whether the fact thereof was concealed from the plaintiff or otherwise, at the time of the marriage, formed no ground whatever for a sentence of divorce. And in the more recent case of *Perrin vs. Perrin*, (1 *Adams' Eccl. Rep.* 1,) Sir John Nicholl, the late distinguished official principal of the arches court of Canterbury refused to permit an allegation of such previous incontinence of the wife to be inserted in the libel against her for a divorce charging subsequent acts of adultery. (*And see 4 Partida, tit. 2, law 10.*) Where no other ground for dissolving the marriage exists, the peace and happiness of families imperatively demands that the marriage itself should be considered a waiver of all antecedent misconduct in this respect, and that judicial inquiries as to such misconduct should not be gone into.— We live in a country of equal laws, and we profess to be governed by a code of christian morals, which places the rights of the injured husband and the injured wife upon terms of perfect reciprocity. And if ante-nuptial defilement of the wife can be inquired into for the purpose of obtaining a divorce, on the application of the husband, his previous misconduct in this respect should be equally open to judicial investigation when the complaint is made on the part of the wife. The open investigation, and consequent publicity of the facts in the ordinary course of the litigation in such cases, must inevitably tend to corrupt the public morals, as well as to disturb the peace of other families.— For incontinence is a vice of such a character that none can allow themselves to hear or even to read of its loathsome details, without some danger of mental defilement.

If the laws of this State provide any relief for either of the petitioners, in the present case, it must be under that provision of the Revised

Statutes which authorizes the Court of Chancery to annul the marriage, where the consent of the complainant to such marriage has been obtained by force or fraud. And in case this husband is entitled to such relief under that provision, his claim must be founded upon some additional facts, which are not stated in the petition, but which may nevertheless be susceptible of legal proof. The supreme court of the State of Connecticut, under a law which was substantially the same as ours in its provisions, held that the fraud which would authorize the court to annul the marriage, must be such a fraud as would render the marriage void *ab initio*, and not merely voidable at the election of the party defrauded. The late Judge Reeve, however, in his Treatise on Domestic Relations, shows that he was not satisfied with that decision. And the construction of our statute has not been thus restricted. In *Scott vs. Shufeldt*, (5 *Paige's Rep.* 43,) a decree of nullity was pronounced under the provisions of the statute of this State in a case where the complainant, by the fraud of the defendant and others, had been induced to marry upon a false representation, supported by her oath, that he was the father of the child of which she had been delivered shortly before the marriage; whereas, as the proof showed, she well knew it was not his child, but the child of a negro, at the time she thus induced him to marry her, of which fact he was ignorant, never having seen the child until after the marriage. In that case, however, the complainant brought himself within the protection of the statute by also showing that he never voluntarily cohabited with the defendant after the marriage ceremony was performed, so that there was in fact no consummation of the marriage. It is possible that this husband may bring himself within the principle of that decision, by showing that this nominal wife fraudulently imposed herself upon him as a person who was in a situation to contract matrimony and to consummate the marriage, when she well knew the fact to be otherwise. And perhaps he can show, that upon discovering her situation he refused to receive her as his wife, and never has voluntarily cohabited with her since that time. But nothing short of that can entitle him to any relief under the existing law.

Upon the question whether in my opinion a general law could be passed authorizing a divorce in this and similar cases without detriment to the public interests or the public morals? Considering this as a case of mere deception as to the previous chastity of the wife, and that the marriage has been actually consummated by cohabitation, I unhesitatingly answer in the negative. And that opinion is not only founded upon what I have before stated in reference to the probable consequences of

permitting such investigations to be gone into, but upon the more important considerations which I will proceed to state.

Marriage, to a certain extent, is a civil contract, and therefore necessarily subject to human legislation, not only in relation to the forms of the contract itself, but also as to the ages and mental capacities of those who shall be permitted to enter into the same. It has, therefore, been deemed proper among all civilized nations to adopt certain fixed regulations on this subject, and to authorize some judicial tribunal to declare the marriage void where the parties had not the capacity to contract, or where the contract was illegal upon the ground that the forms prescribed by law had not been complied with so as to constitute a valid marriage. The institution, however, is undoubtedly of divine origin, and was intended not only for the propagation and preservation of our species, but to subserve the highest and the best interests of man as a moral and social being. It is true, that amidst the numerous provisions made by Moses, the lawgiver of the Jews, for the various other transactions of life, no ceremony or form was prescribed for the celebration of marriage. Yet we have the express declaration of the Saviour, that from the beginning of the creation God made our species male and female. And that for this cause a man should leave his father and mother and cleave to his wife, so that they should no more be twain, but one flesh. This of itself was the institution of a marriage between the sexes; though the form in which the mutual consent of the parties to become man and wife was evidenced, in the early ages, is not stated in the sacred volume. But in relation to the perpetuity of the contract, the Saviour adds, "What therefore God hath joined together let not man put asunder." In other words, the form and validity of the marriage contract, at the time it is entered into, is by divine revelation left as a proper subject of human legislation; but marriage itself, when duly contracted and consummated by actual cohabitation, is incapable of being dissolved, except for the single cause prescribed by the Son of God himself: the defilement of the marriage bed by one of the parties to the contract.—Shortly before the advent of the Saviour the two distinguished Jewish Rabbis, Shammai & Hillel, so often referred to by Josephus, had adopted very different notions in relation to the permission given to the husband by Moses in the 24th chapter of the book of Deuteronomy, to put away the wife by a bill of divorcement. The pure minded Shammai contended that the permission to put away the wife by a bill of divorcement was confined to the case of uncleanness, mentioned in the first clause of the text; by which uncleanness, as he held, the Jewish law-

giver intended the pollution of adultery. Hillel and his disciples on the contrary, maintained, and probably in accordance with the corrupt spirit of that age, that the cause of divorce mentioned in the first part of the text of the law of Moses, that is where the wife found no favor in the eyes of the husband, was a separate and distinct cause of divorce from the sin of uncleanness, and that the text was to be read disjunctively. It followed, of course, from this construction, that the husband was authorized to repudiate his wife, and marry another, for any cause of dislike. This was in exact accordance with the *devortium bona gratia* of the Roman law, which was in force at that time, with which Hillel and some of his disciples were probably well acquainted. And this construction of the Mosaic law, so well suited to the corrupt inclinations of mankind, we may well imagine became the popular construction, and was so at the advent of the Saviour; especially as we find Gamaliel, the grandson of Hillel, the most popular and esteemed teacher, at that time among the Jews. It was undoubtedly some of this Hillelian school that came to our Saviour subsequent to the delivery of his sermon on the mount, tempting him, inquiring whether it was lawful for a man to put away his wife for every cause, and professing to construe the language of Moses, which was a mere *permission* to repudiate the wife on the ground of her uncleanness, into a *command* to divorce her for any slight cause of dislike. And again, upon that occasion he expressly repudiated the Hillelian heresy, and restored the sacred law of marriage to its original purity, as it had been ordained by God in the beginning of the creation, by declaring that whosoever should put away his wife, except for the cause of adulterous fornication, and should marry another, would himself be guilty of adultery.

Some who do not profess to believe in, or to be governed by the principles of the divine law, are led by false reasoning to imagine that an unrestrained liberty to dissolve the marriage contract, whenever the bonds thereof are found to be irksome to either party, or where the private interest or caprice of either demands its dissolution, would be conducive both to domestic and to individual happiness. Such, however, is not the deliberate reasoning of those who have examined attentively the past history of nations; though Milton, whose mind was poisoned by his own domestic difficulties, forms a remarkable exception to that class of persons. Those who are best acquainted with the subject will say, in the language of Randell Lewis, "The marriage state is the foundation of the community, and the chief bond of society; and by means of this bond our wants are supplied, our lives rendered comfortable, our

capacities are enlarged, and our virtuous affections are called forth into proper exercise. Marriage, indeed, enlarges the scene both of our happiness and of our misery, for it is always an insipid, a vexatious or a happy condition. Yet it is not commonly unhappy, but as life itself is so; and many who complain of connubial sorrows have, perhaps, as much satisfaction as their natures would have admitted, or their conduct have procured in a state of celibacy." And I will add, probably as much as they would be likely to enjoy in a subsequent connection with another. If any imagine that the bonds of marriage can be loosened, with safety to the happiness or the morals of the community, I must refer them to the disorders and domestic infelicity which grew out of the lax doctrines of the Hillelian school, among the Jews. To the case of Salome, the daughter of Herod, who, as Josephus informs us, divorced her husband, the governor of Idumea; to Drusilla the Jewess, the former wife of the King of Emessa, who left him to be the wife of Felix, the Roman Governor; to Bernice and Marianne, the two sisters of Agrippa, who both divorced their husbands; and to Herodias, the daughter of Aristobulus, who caused John the Baptist to be beheaded because he had, in accordance with the law of marriage, as established at the creation, and restored by the Saviour, remonstrated with her second husband upon the illegality of his marrying the wife of his brother, from whom she had thought proper to divorce herself, in conformity to the example first set by Salome. It may also be proper to refer those who are acquainted with the early Roman history, to the corruption of the morals of that nation by the facilities of dissolving the marriage contract in ordinary cases by the *divortium bona gratia*; which practice became so common in the later years of the republic, and which led Seneca, the moralist, to say "Who now is ashamed of breaking the nuptial union, when so many ladies of eminence and quality reckon their years not by the number of consuls, but of husbands; and are divorced in hopes of marrying, and marry in hopes of being divorced." I would also refer them to what Dionysius of Halicarnassus says in commendation of a peculiar kind of marriage instituted by Romulus; by which those who consented to be wedded according to its forms, were absolutely incapable of being divorced. (*See Puff. B. 6, chap. 1, sec. 20.*) And lastly, let me refer them to the actual upbreking of all that was sacred in the domestic relations of France during one period of her revolution, when, according to a report of the Abbe Gregoire, as chairman of a committee of the National Assembly, upwards of twenty thousand divorces were registered in the short space of eighteen months; and during a part of which time the number of divorces in the

city of Paris was nearly equal to the number of marriages. In view of the blighting curse which their law of divorce had brought upon his country, well might the Abbe exclaim, "Surely this law will soon desolate or ruin the whole nation!"

Although I believe this divorce law of revolutionary France, which, with many restrictions, was afterwards incorporated into the Napoleon code, has been abolished for more than twenty years, a century must probably elapse before its demoralizing effects will cease to be felt. The existing state of public morals there, arising from this as one of the principal causes, may be inferred from the fact stated in a recent letter of one of our most intelligent citizens now on a visit to that country, that of the 29,104 children born in the city of Paris during the year 1834, more than one-third of the number were illegitimate. And permit me to say, that such in my opinion, will eventually be the moral state of any country whose course of legislation tends materially to impair the sanctity of the marriage vow, or to weaken that strong bond of social order and happiness—the conjugal relation.

Believing, as I do, that our laws in relation to the granting of divorces which shall have the effect of absolutely dissolving the marriage contract, has been already carried by our Legislature to the utmost bounds which are permitted by the divine law; and, independent of this consideration, being convinced by a judicial experience of sixteen years in such matters, that the peace and happiness of society would not be promoted, but that on the contrary, the public morals may be endangered by extending the facilities for dissolving the bonds of marriage, I cannot say, that in my opinion any further legislation on that subject "is desirable at the present time." Many hard cases, or at least those which are apparently so, must and do constantly occur. But it is impossible, by legislation "to cure all the ills that flesh is heir to;" as suffering and affliction is inseparable from human nature, and the miseries of life are very frequently increased by the abandonment of fundamental principles of legislation and of morals, in the vain attempt to provide for all hard cases. Permit me, however, to add, that the question as to the expediency of legislation on any particular subject, is one which more properly belongs to the members of the Legislature themselves, under a proper sense of their responsibility to their country and to their God, than to the judicial tribunals of the State. But I have not, for a moment, hesitated on that account, to express my own opinions fully and freely upon the several questions propounded to me by your honorable body. All which is respectfully submitted.

R. HYDE WALWORTH, *Chancellor.*

March 14th, 1839.

PETITION

Of Harvey Sniffin and Phebe his wife, of the town
of Rye, Westchester county, praying for a bill
of divorce.

*To the honorable the Legislature of the State of New-York, in Senate and
Assembly convened.*

I, Harvey Sniffin, town of Rye, county of Westchester and State of New-York, and Phebe my wife, respectfully sheweth to your honorable body that we are desirous of obtaining a bill of divorce from the present Legislature, from the following grounds, which we the said parties acknowledge to be correct. Your memorialists further state that there is no probability that we the said parties will ever live together again; that your memorialists have no family to maintain, and that if you grant the prayer of your petitioners your memorialists shall ever pray.

Subscribed by the parties.

HARVEY SNIFFIN.
PHEBE D. SNIFFIN.

Dated Rye, Feb. 15th, 1839.

Singular case.—The express of yesterday contained the following statement of a case which came before the October term of the supreme judicial court at Albany. Harvey Sniffin vs. Stephen Buckhout—Special action on the case for a fraud practised by the defendant.

The case, as appears by the record, was as follows: The defendant, a married man with a family, took an infant female named Phebe Gale to be brought up and taught those moral principles fit and proper for a female. That the plaintiff, a young man, was by the defendant introduced in his family to the said Phebe; that the said Buckhout had not brought up the said Phebe, &c. that he knew her to be of bad character, and a harlot; that the said Buckhout had debauched, and from time to time criminally known the said Phebe while she lived with and in his family; that by such criminal connection the said Phebe had become pregnant with child by him. Yet the said Buckhout contriving, and fraudulently intending to deceive and injure the plaintiff, and induce him to enter into a contract of marriage with the said Phebe, falsely, fraudulently, and deceitfully represented to the said plaintiff that he had brought up the said Phebe from her infancy as one of his children; that she was

a good and virtuous girl; that she had been morally brought up, &c.— That the plaintiff knowing nothing to the contrary, but believing the representation of the said defendant to be true, entered into a marriage contract with the said Phebe, and that some time thereafter he discovered the said fraud so practised as aforesaid upon him by the said Buckhout. By means of which fraud he sustained damages, &c. The defendant, by his plea, admitted the facts charged against him by the plaintiff, and put his case upon a question of law; that is, whether an action could be maintained against him for a fraud and imposition like the one above stated and admitted. His honor Justice Cowen, in an able opinion, sustained the action, but the learned Chief Justice Nelson and Justice Bronson, overruled Justice Cowen.

Judge Cowen's opinion will be published in the 18th Wendell's Reports. We hope that the other opinions will also appear, for if a man has no remedy in such a case, it is indeed hard.

IN ASSEMBLY,

March 15, 1839.

REPORT

Of the select committee on the petition of the commissioners of common schools of the town of Pomfret.

Mr. T. Judson, from the select committee to which was referred the petition of the commissioners of common schools of the town of Pomfret, and sundry other citizens of Chautauque county, praying for a law authorizing the clerk of said county to receive from the Treasurer of this State the money belonging to said county for the support of common schools, and to pay the same to the commissioners of common schools of the several towns in said county,

REPORTS:

That from information obtained by your committee, and which they have no doubt is correct, it appears that at the annual meeting of the board of supervisors, a joint meeting was organized, consisting of the judges and supervisors of said county, and during the progress of said joint meeting, E. P. Upham, the treasurer of said county, was removed from said office of treasurer, by a majority of said joint meeting voting for said removal.

It further appears that during said joint meeting, a resolution was offered and adopted, stating the time and place at which they would meet to appoint a treasurer for said county; and that at the time and place mentioned therein, the supervisors assembled, but the judges did not assemble with the supervisors, and therefore no joint meeting was organized, in consequence of the judges not being present.

The supervisors, thereupon, proceeded to appoint a treasurer, and by a majority of the votes, Robertson Whiteside was appointed treasurer. Subsequently, the first judge of said county neglected or refused to sign the appointment of the said Robertson Whiteside.

On motion before his honor Chief Justice Nelson, a mandamus was issued in the alternative, requiring the first judge of said county to sign the appointment of Robertson Whiteside as treasurer of said county, or show cause why he refuses to sign said appointment.

Your committee not having been informed which course will be adopted by the said first judge relative to said mandamus, and being aware that the time is near when the moneys appropriated for the support of common schools should be distributed to the several towns in said county; and as the Treasurer of this State does not recognize a treasurer of said county, thereby rendering it necessary that some legislative action should be taken, for the purpose of enabling the inhabitants of said county to receive their portion of the money appropriated to them for the support of common schools, have therefore prepared a bill for that purpose, which they ask leave to introduce.

No. 306.

IN ASSEMBLY,

March 18, 1839.

REPORT

Of the committee on the judiciary, on the petition of citizens of the fifth ward of the city of Albany.

Mr. Lawrence, from the committee on the judiciary, to which was referred the petition and remonstrance of citizens of the fifth ward of the city of Albany, relative to the powers of the justice of the peace in said ward,

REPORTS:

That the petitioners represent, that by a law passed April 5, 1828, the Governor and Senate were required to appoint a justice of the peace for said ward with limited powers. They further represent, that the rapid increase of business on the river and canal, as well as the rapid increase of population and business of said ward, requires that the business part of the community should have a justice's court with full powers.

The act authorizing the appointment of a justice of the peace for the fifth ward of the city of Albany, gives to the justice all the powers and privileges of a justice of the peace, as to keeping the peace in the city and county of Albany; and in case any offence, under the degree of grand larceny, be committed within the city and county of Albany, and the person charged therewith before the said justice, in due form of law, shall not forthwith give good bail to appear and answer, at the next court of general sessions of the peace in said city and county, or declare his election to be tried by a court of special sessions, such person shall be committed to jail; and in case he shall not give such bail within forty-eight hours after being so committed, or in case he shall

[Assem. No. 306.]

and on testimony: 1

declare his election within the said forty-eight hours, to be tried by a court of special sessions, the said justice shall certify the process with the cause of arrest or commitment, to the justices of the justices' court of the city of Albany, who are thereupon required to proceed to try such offender in like manner, as other courts of special sessions are authorized by law to try offenders. The justice in said ward is also authorized to issue process for the recovery of any debt or demand, returnable in the justices' court in the city of Albany, in like manner and with like effect, as other process by law returnable in said court; and upon the return of such process, the said court is required to proceed thereon as though such process had been issued by the clerk of said court.

The petitioners ask to have the powers of the said justice in the fifth ward enlarged, so that he shall have and exercise the usual powers of a justice of the peace in the towns of this State.

Against granting the prayer of the petitioners there is a remonstrance, signed by both of the aldermen of said ward, and by a large number of citizens, whose standing in society, as the committee are informed, entitle their views to respect. The remonstrants state, that believing that the powers which the said justice already possesses, have not been always exercised with a view to promote the public weal, but, on the contrary, have not unfrequently been used in instigating vexatious suits, they are of opinion that said court instead of being a benefit, has proved very injurious to said ward.

They also represent, that in many instances canal boat captains, instead of bringing their freight direct to Albany, by way of the canal, have entered the Hudson river at West-Troy, and from thence have been towed to the Albany basin, for the purpose of avoiding individuals whose only occupations appear to consist in prosecuting boatmen, and that it is difficult for strangers whose business calls them to the vicinity of the basin, to avoid litigation. The remonstrants pray that the office of justice in said ward may be entirely abolished.

By the charter of the city of Albany, the aldermen of the several wards are *ex-officio* justices of the peace, and there are two aldermen in each ward. Besides, the common council of said city has the power of appointing three police justices in said city, and by a special law the justices' court has been established, consisting of three justices. All of their officers possess the necessary powers for keeping the peace, and the justices' court is specially authorized to try suits for the recovery of

any debt or demand under fifty dollars. Under these circumstances the committee are of opinion, that public justice does not demand the continuance of the office of justice of the peace in said ward, and they have concluded that the prayer of the remonstrants ought to be granted, and ask leave to introduce a bill repealing the act authorizing the appointing of a justice of the peace for the fifth ward of the city of Albany.

IN ASSEMBLY,

March 19, 1839.

REPORT

Of the committee on the judiciary, on the petition
of John H. Smith.

Mr. McElrath, from the committee on the judiciary, to which was referred the petition of John H. Smith, for authority to change his name,

REPORTS:

That the petitioner sets forth in his memorial, that in common with all others who are "*possessed with* the universal name of John Smith," he experiences the greatest inconvenience, and that on several occasions according to "the newspaper authority, he has been sentenced to the penitentiary;" sometimes during his "natural life," and at "other times for a shorter period;" that his family name of Smith has ceased to be a name, by which it is possible for any one to be distinguished, and that it is frequently assumed for unworthy purposes and as a cover for crime. The petitioner further states, that in the event of his legally assuming another name, he will be "entitled to a farm in the State of New-Jersey."

The committee are of opinion that the prayer of the petitioner is reasonable, and ought to be granted, and accordingly ask leave to introduce a bill.

No. 308.

IN ASSEMBLY,

March 16, 1839.

REPORT

Of the Canal Commissioners, on the petition of
John Hadcock.

The Canal Commissioners, to whom was referred by the Assembly, the petition of John Hadcock, respectfully submit the following

REPORT:

The petitioner represents, that he is the owner of lot number three of the Oneida purchase, bounded north on the Erie canal, and that in consequence of raising the banks of said canal, he has sustained heavy damages on said premises.

The petitioner asks for the passage of a law, authorising the Canal Commissioners, or some other tribunal, to ascertain and pay such reasonable amount as he is in justice entitled to receive.

The affidavit of John L. Williams, accompanying the petition, states, that "he has lived adjoining lot No. 3, belonging to John Hadcock, for the term of about ten years, and is satisfied that on account of raising the banks of the Erie canal, has injured that lot very much, and on account of setting the Cowassalon creek back, and flowing said lot."

The Cowassalon creek is taken in as a feeder to the Erie canal, on or near the land of petitioner. The creek sometimes overflows its banks and runs on to the land adjoining it. The land near the place where the feeder enters the canal, is lower than the banks of the canal, and the water can only pass from the land through a culvert under the canal near the feeder. The land on the lower side of the canal is so nearly on a level with that on the upper side, that the discharge from the culvert is

much impeded. The water in times of flood, often remains on the land above the canal near this feeder for a number of days. Some of the land from this cause is not fit for cultivation. The Commissioners believe, that the petitioner's land has been injured; but they do not know the extent of such injury. The canal near the land of the petitioner, has been in its present condition for a number of years, and ever since either of the present Commissioners have had special charge of it.

There is a letter from the petitioner addressed to a member of the Assembly, from which it appears, that he is apprehensive that the water in the canal adjoining his land, is to be raised three feet next summer. This he thinks would flow his whole lot. To relieve him from this apprehension, it may be proper to state, that the water in the canal at this place will not be raised next summer, and that when the enlargement of the canal takes place, and it becomes necessary to raise the water, provision will be made for securing his land from further injury from the waters of the canal or feeder.

JONAS EARLL, JUN.,
WM. C. BOUCK,
JOHN BOWMAN,
WILLIAM BAKER.

Albany, March 16, 1839.

STATE OF NEW-YORK.

No. 309.

IN ASSEMBLY,

March 2, 1839.

ANNUAL REPORT

Of James Gardner, an Inspector of Beef and Pork
for the city of New-York.

TO THE LEGISLATURE OF THE STATE OF NEW-YORK.

In conformity with the provisions of the laws regulating the inspecting and repacking of beef and pork, I hereby report, that the quantity, qualities and value of the beef and pork, inspected and repacked by me, from the first day of January, 1838, to the first day of January, 1839, are as follows, viz:

Brls.	Ave. price per brl.	Amount.
1,842 mess pork,.....	\$20	\$36,840 00
1,981 prime do	15	29,715 00
578 thin mess pork,.....	19	10,982 00
130 clear pork,	23	2,990 00
31 rump do	17	527 00
61 flank do	18½	1,128 50
12 neck do	17	204 00
12 head pork,	9	108 00
10 shoulder pork,	10	100 00
14 head and shoulder pork,	9½	133 00
12 soft prime pork,.....	14	168 00
90 sour prime do	14	1,260 00
64 sour mess do	17	1,088 00
18 rusty prime do	13	234 00
12 rusty mess do	17	204 00
46 soft mess do	18	828 00

Carried forward,.....

Brought forward,..... \$		
Brls.	Ave price per brls.	Amount.
32 sour shoulders pork,.....	\$8	256 00
80 mess beef,.....	14½	1,160 00
90 prime beef,.....	11	990 00
18 refuse beef,.....	4	72 00
<hr/> 5,133 total brls. beef and pork.		<hr/> \$88,997 50
10 half brls. mess pork,.....	10½	105 00
21 do prime do	8	168 00
32 do mess beef,	7	240 00
9 do prime do	5½	51 75
<hr/> 72		<hr/> \$89,562 25
<hr/>		<hr/>
4,945 brls. pork.		
188 " beef,		
31 half brls. pork,		
41 do beef,		
Inspection fees on 5,133 brls. at 15 cents per brl.....		
		\$1,619 25
Cooperage, &c. on 5,133 do at 10 do do		
		513 30
Inspection and cooperage on 72 half brls. at 20 cts. per brl..		
		14 40
		<hr/> \$1,297 65
Store rent, labor, &c.....		700 00
JAMES GARDNER, <i>Inspector.</i>		

New-York, Feb. 1839.

STATE OF NEW-YORK.

No. 310.

IN ASSEMBLY,

March 2, 1839.

ANNUAL REPORT

Of Thomas Gardner, an Inspector of Beef and Pork
for the city of New-York.

TO THE LEGISLATURE OF THE STATE OF NEW-YORK

In conformity with the provisions of the laws regulating the inspecting and repacking of beef and pork, I hereby report, that the quantity, qualities and value of the beef and pork, inspected and repacked by me, from the first day of January, 1838, to the first day of January, 1839, are as follows, viz:

Brls.	Ave. price per brl.	Amount.
4,333 mess pork,	\$20	\$86,660 00
3,459 prime do	15	51,885 00
999 thin mess pork,	19	8,991 00
277 clear pork,	23	6,371 00
111 rump do	18	1,998 00
220 flank do	18½	4,070 00
22 neck do	17	374 00
62 butt and rump pork,	18½	1,147 00
33 heads pork,	9	297 00
29 shoulders pork,	10	290 00
24 heads and shoulders pork,	9½	228 00
58 soft prime pork,	14	812 00
311 sour prime do	14	4,354 00
168 sour mess do	17	2,856 00
116 rusty prime do	13	1,508 00
75 soft mess do	17	1,275 00

Carried forward,

Brought forward,.....		\$	
Brls.	Ave. price per brl.		Amount.
112 sour shoulders pork,.....	\$8		896 00
196 mess beef,.....	14		2,744 00
148 prime beef,.....	11		1,628 00
42 refuse beef,.....	4		168 00
32 half brls. mess pork,.....	10½		336 00
59 do prime do	8		472 00
109 do mess beef,.....	7½		817 50
28 do prime do	5½		161 50
<u>10,795</u>	<u>228 half brls.</u>		<u>\$180,339 00</u>

10,409 brls. pork.

386 " beef,

91 half brls. pork,

137 do beef,

Inspection fees on 10,795 brls. at 15 cents per brl. \$1,619 25

Cooperage, &c. on 10,795 do at 10 do do 1,079 50

Inspection and cooperage on 228 half brls. at 20 cts. per b.l. 45 60

\$2,744 35

Store rent, labor, &c. 1,800 00

THOMAS GARDNER, *Inspector.*

New-York, Feb. 1839.

STATE OF NEW-YORK.

No. 311.

IN ASSEMBLY,

March 2, 1839.

ANNUAL REPORT

Of Lawrence Halenbake, an Inspector of Lumber
for the city and county of Albany.

TO THE LEGISLATURE OF THE STATE OF NEW-YORK.

The undersigned, an inspector of lumber for the city of Albany, respectfully reports, that the annexed schedule presents a correct statement of the quantity of lumber measured and inspected by him during the past year, and an estimate of the average prices of the same, according to the best of his knowledge and belief.

Feet.	Ave. price per. M.
19,539 oak plank,	\$20 to 25
967,258 hemlock and spruce timber,	8 to 11
21,365 pine timber 1st quality,	10 to 14
2,134 do 2d do	10 to 14
70,112 pine boards, 1st, 2d, 3rd, quality,	25 to 27
616,411 do 4th quality,	10 to 13
12,739 ash plank,	14 to 16
42,083 cherry plank and boards,	20 to 25
19,924 chesnut joist,	13 to 15
39,638 basswood plank and boards,	9 to 11
9,687 walnut plank and boards,	24 to 25
12,238 maple joist and plank,	15 to 18
28,865 hemlock boards and joist,	9 to 10

1,861,993 feet in all.

Fees, \$593.49

All which is respectfully submitted.

LAWRENCE HALENBAKE, *Inspector.*

Albany, Jan. 21st, 1839.

[Assem. No. 311.]

No. 312.

IN ASSEMBLY,
March 18, 1839.

REPORT

Of the select committee, on the petition of inhabitants of Ellicott, in Chautauque county.

Mr. Lewis, from the select committee to which was referred the petition of sundry inhabitants of the town of Ellicott, Chautauque county, for an act to authorize said town to raise money for the leasing or purchasing of a town house for said town,

REPORTS:

That the said town is now destitute of any house in which to transact their town business, and that such house is very necessary in that town, and that the voters of that town, at the last annual town meeting, by an almost unanimous vote, declared themselves in favor of raising \$600 for the purpose aforesaid.

The committee believe, that the necessary notice has been duly published, and the committee have come to a conclusion in favor of the prayer of the petitioners, and now ask leave to introduce a bill.

No. 313.

IN ASSEMBLY,

March 19, 1839.

REPORT

Of the select committee on the memorial of citizens of New-York.

Mr. Scoles, from the select committee consisting of the delegation from the city of New-York, to which were referred numerous memorials of landholders and lessees of said city, praying for a revision and amendment of the laws by which the mayor, aldermen and commonalty of said city are authorized and empowered to lay out streets, &c.

REPORTS:

That the act of the Legislature referred to by the memorialists was passed April 9th, 1813, and is to be found in 2d Revised Laws of 1813, page 342. It empowers the mayor, aldermen and commonalty of the city of New-York to open and lay out streets, &c. and to apply to the supreme court of the State for the appointment of Commissioners to make estimate of damage, and benefit to parties interested in land required and taken for such opening and laying out streets, &c.

Your committee have carefully examined this act of the Legislature, and also the various objections to the same contained in the memorials of the said memorialists, and are satisfied that the said act needs revision and amendment.

Your committee deem it just and proper that before private property is taken for the purpose of opening, extending, or altering a street, &c. there should be a petition presented from some portion of those whose property will be directly affected by it, and who will be obliged to bear the principal burden of the assessment. By the act in question, no such

petition is required. Your committee are of opinion that such petition should be signed by the landholders owning at least one-half of the lands required in whole or in part, and duly verified, previous to the presentation of the same to the common council.

Your committee consider the mode of appointing commissioners of estimate and assessment objectionable and unsatisfactory. It ought to be done by some tribunal in the city of New-York, as the whole matter refers exclusively to that city; and the parties interested ought to have some voice in their appointment, or at least some opportunity of making objection to them on the score of interest or incapacity.

The said commissioners should be required to report both the amount of loss and damage, and the amount of benefit and advantage in cases where both occur; whereas now, they are expressly confined to report the excess only where any such exists, and the equality of damage and benefit in other cases, instead of showing in their report the manner in which they get at their results, so that errors may be detected, if any have been made.

The notice of the deposite of the copy of assessment in the county clerk's office, and the length of time within which objections may be made, are altogether insufficient, and this part of the act in question certainly merits the strong condemnatory language of the memorialist.

Your committee are also of opinion that a compulsory process should issue, where the affidavit of a witness is necessary, and he refuses to appear and testify; and that before the commissioners ultimately decide upon the several amounts of allowance for damage and assessment for benefit, they should afford the parties interested a full and fair hearing.

The said commissioners ought to have the power, in cases where the improvement was originally suggested and passed upon by the common council as necessary or desirable for the public convenience or health, and the commissioners are satisfied that the benefit will be to the whole city, and not to any particular section of it—to assess upon the city generally, a proper portion of the necessary expense. This, the said act prohibits them from doing, and they can in no case of public benefit, assess upon the said city, more than one-third of the estimated value of the *buildings* taken.

Under the said act, interest may be and has been demanded on the amount assessed for the intervening time, between the periods fixed for

the receipt of the amount awarded for loss and damage, and the payment of the amount assessed, where both are made relative to the same person or persons. As the appointment of different periods for receipt and payment is wholly arbitrary, this exaction of interest should be prevented by an amendment of the act.

The said act contains no provision that any notice whatever shall be given of the time, place, or object of any motion made by the commissioners before the supreme court, except the motion to confirm the report; and therefore orders may be obtained from said court materially affecting the rights of property, without the knowledge of the owners and parties interested. In the opinion of your committee, no motion should be made before the court without due notice, so that opposition may be made to it, if the same be deemed necessary by the parties interested.

Your committee cannot close their eyes to the startling fact, that an amount of real estate unparalleled in the annals of our city, has lately been advertised for sale for unpaid assessments; and that this may be done, and parties put to the heavy expenses attendant upon a redemption of this property, without ever having received any notice of such intended sale; all that is now required by law being an advertisement of sale in a public newspaper, which many individuals may never happen to see. This, in a matter of so much importance, your committee deem wholly insufficient, and have therefore provided that a written notice of twenty days of such intended sale shall be given in the manner set forth in the accompanying bill.

The said act contains no provision, that the costs, fees, and charges of the commissioners, their attorneys, counsel, or other persons employed by them, shall be taxed or certified as in other cases of motions made and business transacted before and under the direction of the supreme court, and therefore there is no proper check to extravagant charging and improvident expenditure.

The supreme court have pronounced the provisions of the 179th and 180th sections of the said act unconstitutional. Matter of Albany-street, 11 Wendell, 149.

From a full investigation of the act to which their attention has been directed and its practical operation, your committee are convinced, that the complaints of the citizens of New-York, as set forth in the memorials referred to them, are not without good foundation; that the said act

is oppressive, unjust, and unequal in many of its provisions; and that a regard to the rights and interests of the great body of the people of the city of New-York, requires that the same should be so amended as in the language of the memorials, to "prevent as far as possible the commission of injustice to individuals or the community; give additional security to the rights of property, and impart satisfaction to the public mind, on a matter of immense importance to the people of the city of New-York, without impairing a single necessary or proper power now vested in the common council."

Your committee therefore respectfully ask leave to bring in a bill.

STATE OF NEW-YORK.

No. 314.

IN ASSEMBLY,

March 21, 1839.

REPORT

Of the Comptroller, relative to stock issued to the
Catskill and Canajoharie Rail-Road Company.

STATE OF NEW-YORK, }
Comptroller's Office. }

The Comptroller, in obedience to a resolution of the Hon. the Assembly of the 18th instant, directing him to report to that House whether any, and if any, what amount of stock has been issued by virtue of the act of 1838, to the Catskill and Canajoharie Rail-Road Company; and if any stock has been issued, upon what evidence of expenditure on the part of said company the same was issued,

RESPECTFULLY REPORTS:

That the sum of one hundred thousand dollars of State stock, in certificates of one thousand dollars each, was issued and delivered to the president of said company, in pursuance of the provisions of the said act, on the 24th day of May, 1838; and that the evidence produced of expenditure on the part of said company, and upon which such stock was issued, is contained in the affidavit of five of its directors, residing in the village of Catskill, pursuant to the first section of said act, viz: Thomas B. Cooke, Amos Cornwall, Peter T. Mesick, John Adams and John M. Donnelly. From which affidavit and the accompanying papers, it appeared that the sum of one hundred and fifty thousand, seven hundred and thirty-one $\frac{33}{100}$ dollars had been actually expended in making and constructing the said rail-road.

All which is respectfully submitted.

BATES COOKE, *Comptroller.*

Albany, March 21, 1839.

[Assem. No. 314.]

No. 315.

IN ASSEMBLY,

March 21, 1839.

REPORT

Of the Superintendent of Common Schools, relative
to the prevention of disturbances in common
schools.

The Superintendent of Common Schools, in obedience to a resolution of the Honorable the Assembly, requesting him to report "whether in his opinion, there are any deficiencies in the laws for the protection of common schools from insult and disturbance; and if so, what amendments are necessary to remedy such deficiencies,"

RESPECTFULLY REPORTS:

By the existing laws no special protection is given to the common schools. They may be disturbed, and the purposes of their establishment may be entirely defeated by annoyances which do not amount to criminal offences, and for which there is no redress by civil action. There are other outrages which may be reached by criminal prosecution for an assault, or a battery, or a riot, according to the circumstances. These means are often inadequate, and are attended with so much expense, delay, and vexation, that they will not be adopted in most of the cases requiring redress. The same deficiencies heretofore existed in relation to disturbances of religious instruction and worship; and experience of the necessity of further provisions, induced the Legislature at a very early period to pass a law for a more easy and effectual punishment of such offences. No good reason can be perceived why the general education of our children should not be protected from wanton molestation, as well as our religious instruction. Complaints have reached the Superintendent of rude and improper conduct which broke up a school; and for

[Assem. No. 315.]

which no redress was afforded by law. It seems to him that no occasion can well present itself more imperatively demanding legislative interposition; and he respectfully recommends that the provisions of the seventh article and eighth title of chapter twenty, first part of the Revised Statutes, be applied to the case under consideration, with the right of trial by jury, provided by chapter 78 of the laws of 1834. He believes the very existence of such a law in respect to common schools, will, in itself, operate most effectually to prevent the occurrences which it would be designed to punish. A single section like that which the Superintendent takes the liberty of reporting herewith, will be effectual, and produce the happiest results.

All which is respectfully submitted.

JOHN C. SPENCER,

*Superintendent of
Common Schools.*

SECRETARY'S OFFICE. }
Albany, 21st March, 1839. }

AN ACT

To prevent the disturbance of common schools.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows:

§ 1. No person shall wilfully disturb, interrupt or disquiet any common school, by rude and indecent behaviour, by profane discourse, or by making a noise either within the building where such school shall be kept, or so near it as to disturb the order, quiet or good government of the school, or by rude and insolent language to the teacher in such school; nor shall any person obstruct the free passage of any highway to any school-house within one mile of the same; and whoever shall violate any provision of this section, may be convicted summarily by the officers, and in the manner specified in the seventh article of the eighth title of chapter twentieth and part first of the Revised Statutes, and on such conviction shall forfeit a sum not exceeding twenty-five dollars, to be determined by the officers before whom such conviction shall be had, for the use of the common schools of the town where such offence was committed; and any person complained of for a violation of the provisions of this act, shall be entitled to a trial by jury in the same manner, and subject to the same rules, as provided by chapter seventy-eight of the laws of 1834, and with the like liability to costs.



IN ASSEMBLY,

March 20, 1839.

REPORT

Of the committee on charitable and religious societies, on the petition of the trustees of the First Society of the Methodist Episcopal Church in the village of Auburn.

Mr. Lott, from the standing committee on charitable and religious societies, to which was referred the memorial of the trustees of the First Society of the Methodist Episcopal Church, in the village of Auburn, for the passage of a law to confirm certain acts and doings of said society,

REPORTS:

That the memorialists state, in the year 1819, their society was duly incorporated, pursuant to an act entitled "An act to provide for the incorporation of religious societies," passed April 5th, 1813. That since the said society was so incorporated, they have annually elected their trustees, who have had the charge and control of the temporalities of the said society, and that all those elections have been made and conducted in good faith, yet through ignorance of the precise requirements of the statute, some informalities have been indulged in conducting them.

The memorialists further set forth, that the present trustees, since their election have given a bond, conditioned for the payment (to one James Hall, of the city of New-York,) of the sum of nearly five thousand dollars, which debt was contracted, originally, by the said society through the predecessors of the present trustees, in the purchase of their meeting-house and lot on which it stands.

The principal reason for the application to this Legislature exists in the fact, that a few individuals of said society are of opinion that the

[Assem. No. 316.]

corporation of said society is dissolved by reason of said informalities, and that the minister of said society has in accordance with this view, so declared the fact, and given public notice for a new election of trustees.

Now therefore, provided the newly elected trustees should refuse to pay the outstanding debts of said society, (which from facts in the premises, which might be developed, there is reason to believe they will do,) it would involve the perplexities of an expensive legal investigation.

Inasmuch, therefore, as the individual who now holds the said claim against the trustees, is the assignee, and, as they have every reason to believe, the *bona fide* owner thereof, the said trustees are not disposed to urge the equities, (if any exist) against the original obligee of the said bond, to the prejudice of an innocent owner who has paid a valuable consideration therefor.

In order, therefore, to prevent further altercation on this subject, and to avoid a judicial investigation of the right by which these trustees claim to exercise their offices, they have made their appeal to the Legislature, for the passage of an act, which will supersede the necessity of such an investigation; there being nothing in those informalities which is calculated to prejudice the rights of any, except the trustees and the said James Hall.

The committee, therefore, for the purpose of putting an end to this useless controversy, have prepared a bill, confirming the acts and doings of said society, which they respectfully ask leave to introduce.

No. 317.

IN ASSEMBLY,
March 21, 1839.

MESSAGE

Of the Governor, in relation to the title papers of
the Holland Company.

Albany, March 13, 1829.

TO THE ASSEMBLY.

I have received a communication from John J. Vanderkemp, Esq. general agent of the Holland Company, residing in Philadelphia, informing me that the office of that company at Batavia, will be closed in May next, that the office in Philadelphia will be continued no longer than shall be necessary for winding up the concerns of the company in the State of Pennsylvania, and that the original title papers of the tract of land in this State, formerly owned by that company, are now remaining in the said offices. Mr. Vanderkemp, on behalf of the Holland Company, offers to deliver these title papers, provided they can be deposited in some suitable place for preservation, and suggests that they be deposited in the office of the Secretary of State. It cannot be necessary that I should enlarge upon the importance of securing and preserving these important papers, affecting the title of a portion of the territory of this State forming seven counties, and already containing a population of three hundred thousand.

I respectfully recommend that a law be passed providing for receiving and preserving these documents.

WILLIAM H. SEWARD.

IN ASSEMBLY,

March 21, 1839.

REPORT

Of the select committee, on the special message of the Governor, in reference to providing for the preservation of the title papers of the Holland Land Company.

Mr. Lewis, from the select committee to which was referred the special message of the Governor, in relation to a communication from John J. Vanderkemp, Esq. general agent of the Holland company, residing in Philadelphia; suggesting the propriety of passing an act for the future security of the original title papers of the tract of land formerly owned by the Holland Land Company,

REPORTS:

That it appears from the said communication, the office of that company at Batavia will be closed in May next, and, that the office at Philadelphia will be continued no longer than shall be necessary for winding up the concerns of the said company in Pennsylvania; that those title papers are now remaining in the said office, and that Mr. Vanderkemp proposes to deliver those papers, provided they can be deposited in some suitable place for preservation; and suggests that they be deposited in the office of the Secretary of State.

The committee deem this suggestion an important one, as it involves the title of a portion of the territory of this State, forming seven counties, already containing a population of more than three hundred thousand.

The committee, in view of these facts, without hesitation, recommend the passage of a law providing for the security and preservation of these documents, and have prepared a bill for that purpose, which they now ask leave to introduce.

No. 319.

IN ASSEMBLY,

March 19, 1839.

REPORT

Of the committee on State Prisons, in relation to
paying sheriffs for transporting convicts.

Mr. Hammond, from the committee on State Prisons,

REPORTS:

That by the 15th section of the act entitled, "An act in relation to the State Prisons," passed May 11, 1835, it is provided that the agents of the respective prisons, shall pay to the sheriffs or deputies, for transporting convicts to the prisons, the fees to which they are by law entitled.

The committee are of the opinion, that this section repealed that section of the Revised Statutes, which directed that these fees should be paid on the warrant of the Comptroller, out of the State Treasury; consequently that there is now no law providing for the payment of such fees, except the fifteenth section of the said act of May 11, 1835.

The agent of the State Prison at Auburn, represents to your committee, that there are no funds in his hands to meet these expenses. Your committee believe that provision should be made by law for the payment of the regular accounts of these officers, so soon they shall have delivered their convicts at the prisons. They have therefore prepared a bill, which they ask leave to introduce.

STATE OF NEW-YORK.

No. 320.

IN ASSEMBLY,

March 23, 1839.

LIST OF BILLS

Upon the general orders of the Assembly to March
23d inclusive.

January 19.

74. An act authorizing the Canal Commissioners to construct a bridge across the Erie canal.

January 21.

80. An act for the equal distribution of the literature fund.
82. An act to authorize the building a bridge across the State drain in Lysander.
83. An act in addition to an act to improve the road from Ogdensburgh to Canton.

January 22.

85. An act to amend an act entitled "An act to abolish imprisonment for debt, and to punish fraudulent debtors."
86. An act to perfect an amendment of the Constitution, providing for the election of mayors by the people.

January 23.

96. An act relative to the New-York and Albany Rail-Road Company.

January 25.

105. An act to annex part of the town of Caroline to the town of Danby.
107. An act to amend the charter of the Hudson Fire Insurance Company.

January 28.

- 118. An act in relation to the canal basin in the city of Rochester, known as "Child's slip."
- 119. An act concerning State mortgages.
- 120. An act in relation to the "Act relative to proceedings in suits commenced by declaration, and for other purposes," passed April 29, 1833.

January 29.

- 124. (*Senate.*) An act in relation to Savings Banks.
- 127. An act to prevent false swearing, bribery and corruption, at town meetings.

January 31.

- 129. An act concerning the special terms of the supreme court.
- 130. (*Senate.*) An act in relation to certain trusts.
- 133. An act to amend the act to incorporate the New-York and Harlem Rail-Road Company.

February 2.

- 137. An act to amend the act concerning courts held by justices of the peace.
- 139. An act to aid in the construction of the Auburn and Rochester rail-road.
- 141. An act to amend the act entitled "An act to incorporate the Long-Island Rail-Road Company."
- 144. An act concerning the fees of witnesses.
- 145. An act to amend the provisions of the Revised Statutes respecting the arrest and holding to bail of defendants in suits upon contracts.

February 5.

- 150. An act for the relief of Levi S. Backus.

February 7.

- 157. An act for the preservation of school district libraries.
- 160. An act to provide for the purchase of a new State atlas.

February 8.

- 167. An act to amend an act entitled "An act to prevent usury."

169. An act relative to boards of supervisors.
170. An act to aid in the construction of the New-York and Albany rail-road.
171. An act to regulate the speed of steam-boats in certain parts of the Hudson river.
172. An act in aid of the Genesee Wesleyan Seminary.

February 9.

177. An act granting certain lands under water, to the Hudson and Berkshire Rail-Road Company, and to the city of Hudson.
181. An act to authorize the corporation of the city of Albany to borrow money for the purposes therein mentioned.
182. An act concerning the compensation of the clerks and criers of the supreme court, and of the register, assistant register, and clerks in chancery.

February 11.

186. An act authorizing the Canal Commissioners to improve or reconstruct the chute in the Chemung canal feeder dam, at the foot of the Chimney Narrows.
187. An act to construct a canal from the Chenango canal, at or near Binghamton, to the State line, near Tioga county.
189. An act prescribing the manner in which the Croton Aqueduct shall pass the Harlæm river.

February 12.

195. An act to vest certain lands in the mayor, aldermen and commonalty of the city of New-York, for certain purposes.

February 13.

198. An act to incorporate the New-York Poudrette Company.

February 14.

205. (*Senate.*) An act to annex a part of the town of Urbana to the town of Bath.
206. An act to authorize the Cayuga Bridge Company to abandon their bridge over the outlet of Cayuga lake.
207. An act annexing part of the town of Dryden to Groton.
209. An act amending the act suspending certain provisions of law.
211. An act granting certain lands to the corporation of the village of Syracuse for a public cemetery.

February 15.

213. An act for the erection of a monument to the memory of the late De Witt Clinton.
214. An act to annex a part of the town of Wheeler to the town of Urbana.

February 16.

219. An act relative to the city of Hudson.
220. An act to regulate the value of bank bills.

February 18.

221. An act to provide for the construction of a towing-path from the lock on the Cayuga canal to the foot of steam-boat navigation on the Cayuga lake.
223. An act authorizing the appointment of a supreme Court Commissioner to reside at Salem in the county of Washington.
224. (*Senate.*) An act to incorporate the South Durham Turnpike Road Company.
226. An act requiring sheriffs to publish their names and places of residence and those of their deputies
228. An act conferring additional powers on Thomas J. Wheeler, a judge of the Cattaraugus county courts.
229. An act in relation to writs of certiorari at common law.

February 19.

230. An act to incorporate the Jefferson and Oneida Turnpike Company.
231. An act to authorize the building of a toll-bridge over the Hudson river at Glen's-Falls.

February 20.

235. An act relative to the change of the location of the Erie canal at Rome.
237. An act in relation to the share of the Literature Fund belonging to the first senate district.
239. An act to require the Oswego Bridge Company to erect a draw in their bridge, for the passage of lake vessels.

February 21.

244. An act for the relief of Lewis Beebee and others.

246. An act to annul a part of a certain road, leading from Amsterdam to Rawsonsville.

February 23.

249. An act to construct a fence along the towing-path on the north bank of Seneca river, between Baldwinsville and Mud lock.
250. An act authorizing the survey of a branch canal from the Erie canal to Catskill, and some intermediate points.
256. An act to aid in the construction of the Hudson and Berkshire rail-road.
257. An act to aid in the construction of the New-York and Harlæm rail-road.
258. An act to aid in the construction of the Attica and Buffalo rail-road.
259. An act to aid in the construction of the Long-Island rail-road.

February 25.

264. An act to provide for the construction of the Ogdensburgh and Champlain rail-road.

February 26.

268. An act to incorporate the Gilboa Rail-Road Company.
270. An act for the relief of the University of the city of New-York.
271. An act to incorporate the Western Hospital.
272. An act to amend the law of excise, and for the regulation of taverns and groceries.
273. An act to amend article 3, chapter 13, title 4, and part 1, of the Revised Statutes, relative to the exemption of certain companies from taxation.
274. An act to erect a new county by the name of Union.
275. An act authorizing the reading in evidence the statute laws of adjoining States in the courts of this State.

February 27.

276. An act further to extend the time for the payment of moneys loaned by the commissioners of loans and loan officers, to citizens of this State.
284. (*Senate.*) An act to authorize the Rocky Glen Company to extend their capital.
285. (*Senate.*) An act to authorize the Matteawan Company to extend their capital.

286. An act to aid in the construction of the Schenectady and Troy rail-road.
288. An act for the relief of Jeremiah Dunham.

February 28.

292. An act to provide for the construction of a rail-road from Oswego to Syracuse.
293. An act to aid in the survey of a rail-road and navigation line from the Erie canal, near the village of Little-Falls, to the river St. Lawrence.
294. An act for the construction of a feeder to the Genesee Valley canal.

March 1.

296. An act to incorporate St. James and St. Paul's Roman Catholic churches in the city of Brooklyn.

March 2.

297. An act to erect the town of Seward in the county of Schoharie.
298. An act relative to wills of real estate.
299. An act to authorize the Harmony Manufacturing Company to extend their capital.
301. An act to authorize a canal to connect the Genesee Valley canal with the Genesee river.
302. An act to regulate wharfage to be paid by vessels using the wharves and docks upon the tide waters of the Hudson river.

March 4.

304. An act to aid in the alteration and improvement of the Mohawk and Hudson Rail-Road.
306. An act to improve the agriculture of this State.

March 5.

309. An act in relation to trusts for the benefit of the Meetings of the Religious Society of Friends.

March 6.

312. An act for the relief of the citizens of the town of Carlisle and its vicinity.

March 7.

314. An act to regulate the fees of county clerks.
316. An act to prevent betting on elections.

319. An act to provide for the holding of the October term of the supreme court at Rochester.

March 8.

321. An act in relation to the construction and maintenance of bridges on the enlarged Erie canal.

March 9.

324. (*Senate.*) An act relative to the county courts and judgments rendered therein.

March 11.

332. An act for the improvement of certain highways in the county of Lewis.
333. An act to repeal the act laying out a certain road from Peekskill to Towner's store.
334. An act for the relief of John McKee,

March 12.

337. An act relative to the firemen of the village of Williamsburgh.
339. An act to authorize Stephen A. Halsey to erect wharves adjoining his land in Queens county.
340. An act to provide for the construction of the Dansville side-cut.

March 13.

343. An act relative to the equalization of taxes in the county of Suffolk.
345. An act to incorporate the Hallet's-Cove and Flushing Turnpike Company.
351. An act to authorize the construction of a MacAdam road in the town of Deerfield.

March 14.

352. An act to incorporate the North American Steam Navigation Company of the city of New-York.
353. An act to amend the Revised Statutes relating to attachments against absconding, concealed and non-resident debtors.
355. An act to revive the distinction between town and county poor in the county of Greene.
356. An act to exempt the Croton aqueduct from taxation.

March 15.

- 358. An act to incorporate the Albany City Hospital.
- 359. An act to incorporate the Christian General Book Association.
- 360. An act for the relief of the widow and heirs of Eliphalet Ackley, deceased.

March 16.

- 361. An act authorizing the Utica and Schenectady Rail-Road Company to carry freight.

March 18.

- 364. An act to incorporate the Lansingburgh and Schaghticoke MacAdam Road Company.
- 365. (*Senate.*) An act relative to the foreclosure of mortgages.
- 366. (*Senate.*) An act concerning writs of error, appeals, and costs in certain cases.
- 367. An act to repeal the act entitled "An act authorizing the appointment of a justice of the peace for the fifth ward of the city of Albany.
- 369. An act to authorize the laying out a certain road in Herkimer and Oneida counties.

March 19.

- 370. An act to increase the capital stock of the Maspeth Avenue and Toll Bridge Company.
- 374. An act relative to the support of the poor in the county of Essex.
- 377. An act to amend the act in relation to the State prisons, passed May 11, 1835.
- 378. An act to extend the jurisdiction of justices' courts to one hundred dollars.

March 20.

- 383. (*Senate.*) An act concerning foreign bank notes.

March 21.

- 385. An act to authorize the common council of the city of Schenectady to borrow money on the credit of said city.
- 386. An act to provide for building a bridge across the Oswegatchie river at Ogdensburgh.

March 22.

387. An act to incorporate the Staten Island Ferry Company.
389. An act for the relief of Thomas Horton.
390. An act authorizing the survey of the Lime lake feeder.
391. An act to incorporate the village of Waddington.

March 23.

392. An act relating to the Onondaga and Montezuma salt springs.
393. An act to incorporate the Westchester and Byram River Rail-Road Company.
394. An act to amend the charter of the city of Rochester.
395. An act to amend the charter of the village of DeRuyter.
396. An act in relation to the fire department in the city of Hudson.
397. An act to amend the charter of the Saratoga Academy and Scientific Institute.
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SPECIAL ORDERS.

An act to provide for the sale of lands returned for arrears of taxes in the counties where the same are situated. For Monday, March 18.

An act to improve the agriculture of this State. For Monday, March 25.

IN ASSEMBLY,

March 20, 1839.

REPORT

Of the select committee on the petition of sundry inhabitants of Queens, in relation to a monument, &c.

Mr. Lott, from the select committee consisting of the delegation from the counties on Long-Island, to whom was referred the petition of sundry inhabitants of the county of Queens, praying for the appropriation of certain funds, for the erection of a monument over the remains of the crews and passengers of the ships Bristol and Mexico, who perished on Rockaway beach in the winter of 1836-7,

REPORTS:

That during the winter of 1836-7, the ships Bristol and Mexico were totally lost, by being cast ashore upon Rockaway beach, in the town of Hempstead, in the county of Queens, and with the exception of a few individuals, their whole crews and passengers, amounting to upwards of one hundred and thirty, were drowned. That an event so disastrous, and by which so many lives were lost, deeply excited the sympathy and interested the feelings of the inhabitants of the county, and particularly of the town of Hempstead, and they took early measures to purchase a piece of ground adjoining the burial ground of the Methodist Episcopal Church in the said town, where the bodies of the shipwrecked persons were decently and properly interred, the expense of which was defrayed by voluntary contribution of the inhabitants of the town of Hempstead. That soon afterwards a public meeting was held, and a committee appointed, of which John Bedell was chairman, for the purpose of soliciting and receiving subscriptions, for the erection of a monument over

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the remains of these unfortunate persons, and a sum of one hundred and fifty dollars has been collected for that object; that upon inquiry it has been found, that this sum is inadequate to the purpose intended, as well as for the erection of a suitable fence around the said piece of ground, now known as "The Mariners' Burial Ground," connecting it with the burial ground of the said church.

Under these circumstances the petitioners represent, that they have heard and believe, that a sum of money amounting to two hundred and thirty-eight dollars, is now in the hands of Platt Willets, Esq. the treasurer of the county, and of Nathaniel Seaman, Esq. one of the wreck masters of the said county, arising from the moneys found upon the bodies of those shipwrecked, and as yet unclaimed, and from the sale of unclaimed property from said wrecks, which sum of money by the laws of this State, must unless otherwise disposed of, be paid into the State Treasury; that with the aid of this sum of money they would be enabled to erect a suitable monument, and enclose the burial ground, and thus accomplish a decent and commendable object.

Your committee believe, that the facts set forth by the petitioners are true, and that they are entitled to the favorable consideration of the Legislature; that they have unanimously agreed to prepare a bill in conformity to the prayer of the petitioners, and have directed their chairman to ask leave to introduce the same.

IN ASSEMBLY,

March 21, 1839.

REPORT

Of the select committee, on sundry petitions of citizens of Schenectady.

Mr. Marsh, from the select committee, to which was referred sundry petitions of citizens of Schenectady,

REPORTS:

That the petitioners ask of this Legislature to pass a law, authorizing the corporate authorities of said city to borrow fifty thousand dollars, upon the credit of the city, for the purpose of subscribing that amount to the capital stock of the Coxsackie and Schenectady Rail-Road company, believing, as set forth in the petitions, that the construction of said road will reduce the expense of transportation between the city of New-York and the western parts of the State, and the far west, and conduce to the best interests of said city.

Your committee deeming it to be in accordance with the general policy hitherto pursued by the Legislature, to grant facilities for the promotion of public works of this kind, and believing that the proposed road when completed will be a public benefit, have come to the conclusion, respectfully to ask leave to introduce a bill in conformity to the prayer of the petitioners.

IN ASSEMBLY,

March 21, 1839.

REPORT

Of the committee on State Prisons, on sundry petitions in relation to a House of Refuge for Juvenile Delinquents, in the western part of the State.

Mr. Hammond, from the committee on State Prisons, to which was referred the petitions of sundry inhabitants of Monroe county, praying that a House of Refuge for Juvenile Delinquents, may be established in the western part of the State,

REPORTS:

That notwithstanding the application has some merits, when we take into consideration the great distance and expense of transporting some of those delinquents to the House of Refuge in the city of New-York; and as is represented by the petitioners, this expense many times deters persons from convicting, and courts from sentencing such offenders. Yet on the other hand, taking into consideration the large amount of appropriations which the State is now called upon to make for other purposes, and the propriety of appropriating a sufficient amount when such an establishment is erected, (not only to meet the exigences of the present day,) but also for coming time, your committee have come to a conclusion that the prayer of the petitioners ought not to be granted, and introduce the following resolution:

Resolved, That the prayer of the petitioners ought not to be granted.

IN ASSEMBLY,

March 23, 1839.

REPORT

Of the select committee on the Governor's Message,
in relation to the difficulties on the northeastern
frontier.

Mr. Taylor, from the select committee to which was referred the message of his Excellency the Governor, in relation to the recent events on the northeastern frontier, and also a preamble and resolution upon the same subject,

REPORTS:

That the subject referred to them, in its possible consequences, involves interests of the highest magnitude: on the one hand, the integrity of a State of this Union; and on the other, war with that nation with which, of all others on earth, we should be most willing to make large sacrifices for the preservation of peace. Your committee believe that the interest of the great body of people in both countries demand the preservation of peace, if peace can be preserved consistently with the honor of the country and the rights of Maine.

The committee agree with his Excellency the Governor, that while the State Governments should carefully abstain from any act that might in any degree interfere with the constitutional duties of the Federal Government, occasions may nevertheless, arise, in which they ought to make known to that Government, to foreign nations, and to any aggrieved sister State, that we are a united people, jealous of our sovereignty, and determined to resist aggressions upon the rights and territory of the Union. The measures adopted by Congress, near the close of the late session, and the cause of their measures, seem to present an

occasion for such an expression on the part of the several States. Those measures appear to have been wisely designed to preserve the existing relations of peace between this country and Great Britain, as well as to vindicate the rights of the State of Maine, and to maintain the honor and dignity of the nation. We do not believe that enlightened and christian nations, bound to each other in peculiar relations of feeling and interest, will, unnecessarily, suffer the harmony existing between them to be interrupted. The committee believe, that an expression on our part, of concurrence in the policy of the General Government, will contribute to avert the calamities of war, and secure the speedy and honorable adjustment of the exciting difficulties between this country and Great Britain.

As the moral effect of any such expression of concurrence depends, in a great measure, upon the unanimity with which it is made, and sustained by the Legislature and the people, it is with great satisfaction, that on this occasion, we can cordially unite in recommending the same resolutions, to the favorable consideration of this House, which have already been adopted in the honorable the Senate, by a unanimous vote of that body.

Resolved, That the Assembly concur in the sentiments expressed by his Excellency the Governor, in the special Message transmitted to the Legislature upon the subject of the controversy between the State of Maine and the Province of New-Brunswick.

Resolved, That the Assembly highly approve of the course of the President of the United States, and of the action of Congress in relation to this unfortunate controversy; and that the unanimity with which measures have been adopted, as well to maintain peace, as to repel invasion, is a fit subject of congratulation.

Resolved, That the State of New-York will second the efforts of the General Government to preserve pacific relations with Great Britain, and at the same time hold herself in readiness to aid such government in resisting encroachments upon the rights or territory of any portion of the Union.

Resolved, That copies of these resolutions be transmitted to his Excellency the Governor and to the President of the United States.

No. 325.

IN ASSEMBLY,

March 18, 1839.

REPORT

Of the select committee, on the petition of inhabitants of Herkimer county.

Mr. A. Cook, from the select committee to which was referred the petition of numerous inhabitants of Herkimer county, for an act to authorize the appointment of commissioners to lay out a public highway, from the State road in Salisbury, Herkimer county, to the village of Boonville, Oneida county,

REPORTS:

That the petitioners set forth, that a great and desirable good would result from the laying out and improving a new road, leaving the old Johnstown State road at what is called the old Ford place in Salisbury, Herkimer county; thence pursuing the most direct and eligible route through the towns of Norway, Ohio, and Russia, to the head of the Black river canal feeder; thence to the State road near the village of Boonville, Oneida county.

The petitioners set forth, that the most desirable object to be accomplished by the above proposed improvement, are: 1st. A saving of a number of miles in the distance between Salisbury and Boonville. 2d. A far more level and advantageous route for a road will be found along the proposed track for the new road, than that now occupied by the old State road. 3rd. This road is to pass through a large tract of good farming country, which has never received any direct benefit from the various internal improvements executed by the State.

The committee have come to the conclusion, that the prayer of the petitioners ought to be granted, and have directed their chairman to ask leave to introduce a bill accordingly.





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ASSEMBLY CHAMBER.